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WAR MACHINE

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Armed Forces of the World: Turkey

AEGIS

California in Action

Return of the Battleship

A fully illustrated guide to Modern Cruisers

WAR MACHINE

Volume 3 **Issue 30**

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Armed Forces of the World

Turkey iii

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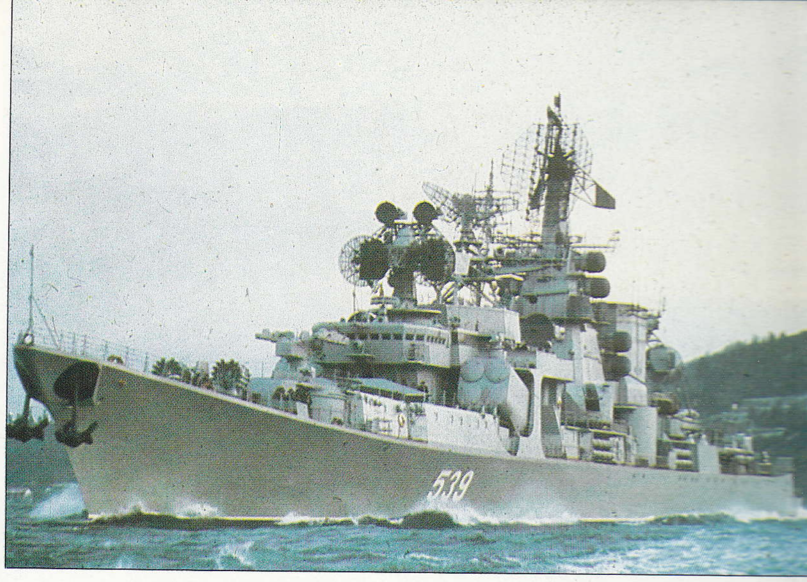
WAR MACHINE

Forthcoming issues feature:
- Modern Strike Aircraft
- Air-to-air Missiles
- Modern Pistols
- Cruisers of World War II
- Armoured Vehicles of World War I

Modern Cruisers

The modern cruiser is a luxury item in the world's navies because of its immense cost. Only the two great superpowers still build them, and they have done away with all gun armament, replacing it with powerful surface-to-air and surface-to-surface missile systems more suitable for modern warfare.



A Soviet navy 'Kara' class Large Anti-Submarine Ship (BPK). These serve only with the Black Sea and Pacific fleets, where they have a command capability. The extremely heavy weapon and sensor fit is characteristic of Soviet practice, and contrasts strongly with the almost stark appearance of their American contemporaries.

Since World War II the cruiser has evolved into an expensive SAM-armed warship capable of operating in the highest-threat areas as a vital part of a task force unit. In the US Navy the cruiser has become both conventionally- and nuclear-powered, and is tasked primarily with the area SAM defence of fast carrier battle groups. In the Soviet navy only the 'Sverdlov' class of conventional gun cruisers remains, the other vessels classified by NATO as cruisers being purpose-built and anti-ship (RKR) or anti-submarine (BPK and PKR) warfare vessels. The traditional fire-support gun cruisers in most other navies have been paid off, sold or converted to hybrid helicopter carriers or SAM ships as the rush for missile-armed ships in the 1960s gained momentum. Most of the conversions have now been scrapped, but several of the older, ex-European gun ships still serve in South American waters under the Chilean and Peruvian flags.

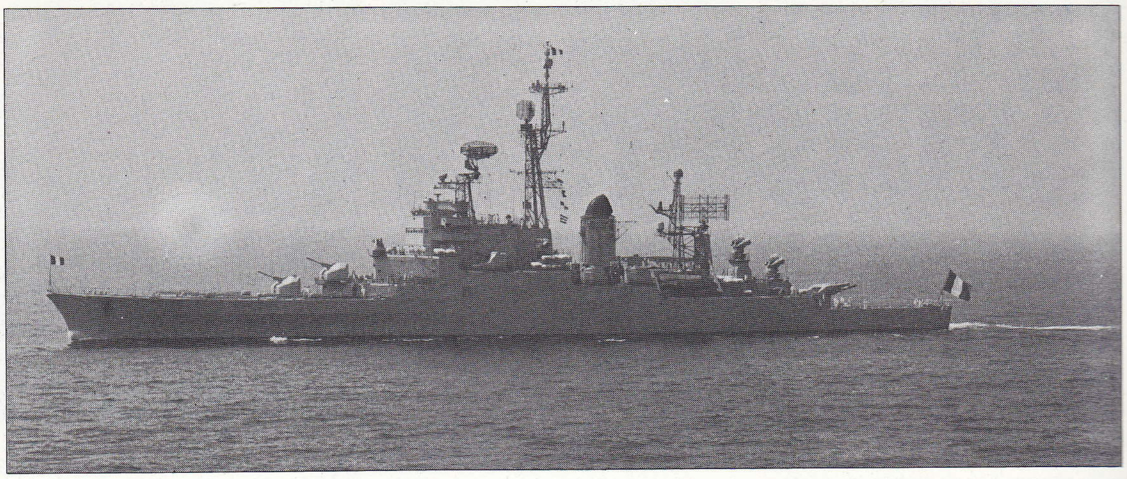
The Soviets with their 'Kirov' class nuclear-powered vessel have introduced the nearest thing to the obsolete battle-cruiser category currently in service. In order to match this, and to beef up American surface fleet firepower capabilities in naval gunfire support and anti-ship warfare, the US Navy has started a reactivation and modification programme for their mothballed 'Iowa' class battleships which were last seen in action when the USS *New Jersey* served as a floating battery off Vietnam during 1968-9. With an armament of Harpoon and Tomahawk SSMs (and possibly aircraft in the future) the 'Iowa' class ships will be the most powerful combatants afloat.

It is also salutary to note that had the UK had available either HMS *Tiger* or HMS *Blake* (the hybrid helicopter carrier conversions with a twin 152-mm/6-in automatic turret forward) for the Falklands campaign then the job of keeping Port Stanley airfield under naval and air bombardment to prevent Argentine air operations there might have been considerably easier than it was, and the heavier HE shells would also have caused greater damage to Argentine positions ashore. The Americans have also learnt this lesson as the *New Jersey* was used in 1983/4 off Lebanon to hit inland anti-aircraft positions with her 406-mm (16-in) main armament so as to limit the risks to American aircraft without hazarding personnel in air-defence suppression strikes.

This photograph of six US nuclear-powered cruisers steaming together is a rare sight. Normally operating in pairs to provide air cover to nuclear carriers, they were involved in Exercise 'READEX I-81' in the Caribbean on 26 February 1981.

FRANCE

'Colbert' class



Serving as the flagship of the French Mediterranean Fleet, the Colbert *recently underwent a refit to extend her operational life past the year 1995. Included in it was the upgrading of her Masurca SAM system to meet the threat of Soviet bombers and anti-ship missiles.*

A development of the pre-war 'De Grasse' design, the post-war Brest-built ***Colbert*** (C 611) was commissioned in 1959, and incorporated a number of modifications such as an increase in beam, different armour protection and a shortened transom stern that improved her stability and allowed for a helicopter landing pad to be carried aft.

From April 1970 until October 1972 the *Colbert* underwent a major refit to equip her with the Masurca area-defence SAM system for fleet-defence duties. As a result of financial restraints the original refit plan had to be modified to include the retention of some of her original AA armament. The bridge structure was rebuilt and air-conditioning was installed throughout. In order to cope with the increased power requirements thus needed, the electrical generator system was uprated to give a 5000-kW output. A modernized electronics suite was also installed, and a SENIT-1 action information system was fitted in the operations room to enable the *Colbert* to act as a flagship for the French Mediterranean fleet, a role in which she has served since the end of the 1970 refit. From August 1981 to November 1982 she underwent a second major refit to extend her operational life past 1995. During this a satellite communications system was fitted and improvements made to extend the range of the Masurca Mk 2 Mod 3 semi-active homing missiles beyond their normal 60 km (37 miles); the altitude engagement limits of the missile are between 30 and 22500 m (100 and 73,820 ft).

Specification
'Colbert' class

Displacement: 8,500 tons standard and 11,300 tons full load

Dimensions: length 180.0 m (590.55 ft); beam 20.2 m (66.27 ft); draught 7.9 m (25.9 ft)

Propulsion: geared steam turbines delivering 86,000 shp (64130 kW) to two shafts

Speed: 31.5 kts

Complement: 562

Aircraft: none embarked, though a helicopter platform is provided

Armament: four MM.38 Exocet SSM launchers with four missiles, one twin Masurca SAM launcher with 48 missiles, two 100-mm (3.9-in) DP guns and six twin 57-mm AA guns

Electronics: one DRBV 23C air-search radar, one DRBI 10D height-finder radar, one DRBV 50 tactical radar, one Decca RM 416 navigation radar, one DRBV 20 air-search radar, two DRBR 51 SAM fire-control radar, one DRBR 32C gun fire-control radar, two DRBC 31 100-mm (3.9-in) fire-control radars, one URN-20 TACAN, one SENIT-1 action information system, one passive ECM suite, and two Syllex chaff launchers.

ITALY

'Vittorio Veneto' class

Originally to have been a third 'Andrea Doria' class ship, the ***Vittorio Veneto*** (C 550) was radically altered in design on several occasions when it was realized that these earlier ships were too small. The *Vittorio Veneto* is thus half as large again as an 'Andrea Doria', with a raised 40 m (131.2 ft) by 18.5 m (60.7 ft) flight deck aft with a two-decks deep 27.5 m (90.2 ft) by 15.3 m (50.2 ft) hangar below it. This allows up to nine AB.204As or AB.212ASW or six SH-3D Sea King ASW helicopters to be carried, although the two 18 m (59.1 ft) by 5.3 m (17.4 ft) aircraft lifts preclude the Sea Kings from being struck down into the hangar. The extra space forward allows the fitting of an American Mk 20 Aster SAM/ASW launcher system in place of the Mk 10 used on the 'Andrea Doria' class. The new launcher has three rotary drums loaded with 40 SAMs and 20 ASROC ASW missiles so that the operations centre can choose the missile type to be fired according to the nature of the threat detected. During her latest refit (1981-3) the *Veneto* was modified to fire the Standard SM1-ER SAM. She also had fitted four Teseo launchers for Otomat SSMs, and two Dardo close-in weapon system mountings with three twin 40-mm Breda gun turrets. The *Veneto*, which was originally commissioned in 1969, is currently used as the Italian navy's flagship, but she will hand this role over to the carrier *Giuseppe Garibaldi* when the latter commissions.

Specification
'Vittorio Veneto' class

Displacement: 7,500 tons standard and 8,870 tons full load

Dimensions: length 179.6 m (589.25 ft); beam 19.4 m (63.6 ft); draught 6.0 m (19.7 ft)

Propulsion: geared steam turbines delivering 73,000 shp (54435 kW) to two shafts

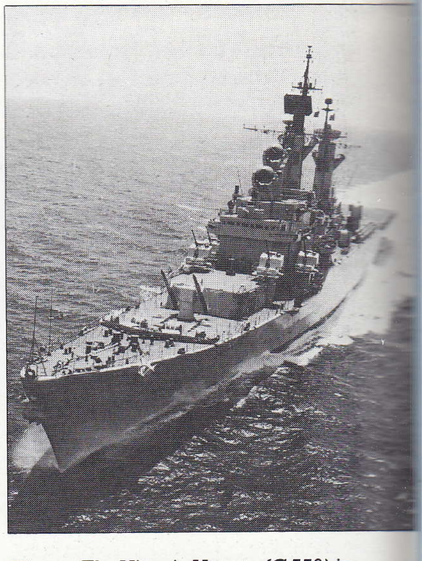
Speed: 30.5 kts

Complement: 565

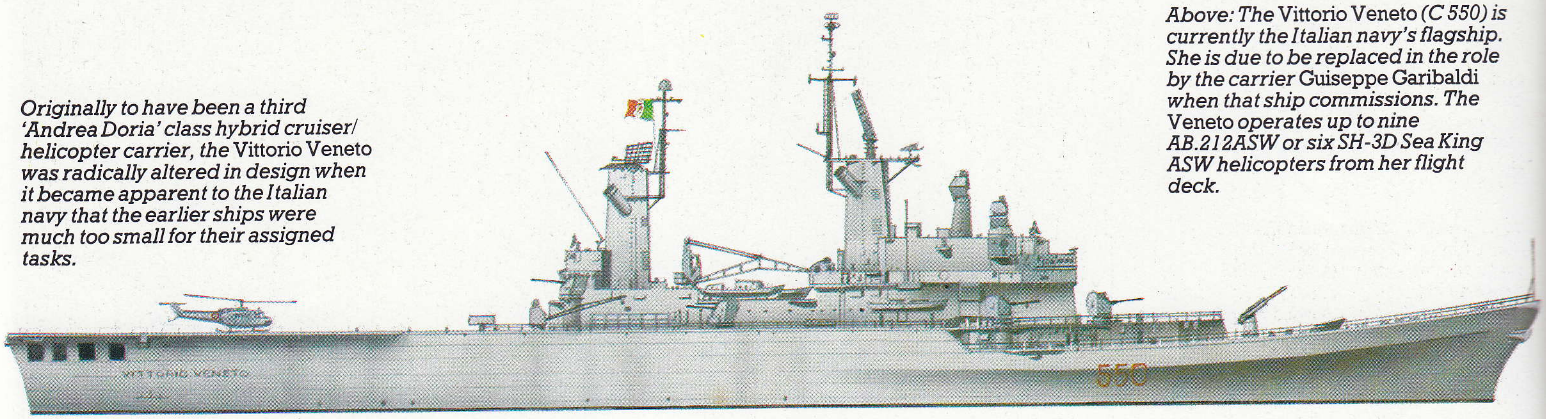
Aircraft: nine Agusta (Bell) AB.212ASW or six Agusta (Sikorsky) SH-3D Sea King anti-submarine and anti-ship helicopters

Armament: one twin Standard SM1-ER/ASROC SAM6 ASW launcher with 40 Standard and 20 ASROC missiles, four Teseo SSM launchers with four Otomat missiles, eight 76-mm (3-in) DP guns, three twin 35-mm CIWS mountings, and two triple 324-mm (12.75-in) ASW torpedo tube mountings for Mk 44, Mk 46 and A244 torpedoes

Electronics: one SPS-52C 3D radar, one SPS-40 air-search radar, one SPS-70 surface-search radar, two SPG 55C SAM fire-control radars, four RTN10X 76-mm (3-in) fire-control radars, two Dardo CIWS fire-control radars, three RM7 navigation radars, one Abbey Hill passive ESM suite, two SCLAR flare/chaff launchers, and one SQS-23 sonar



Above: The Vittorio Veneto *(C 550) is currently the Italian navy's flagship. She is due to be replaced in the role by the carrier* Guiseppe Garibaldi *when that ship commissions. The* Veneto *operates up to nine AB.212ASW or six SH-3D Sea King ASW helicopters from her flight deck.*



Originally to have been a third 'Andrea Doria' class hybrid cruiser/ helicopter carrier, the Vittorio Veneto *was radically altered in design when it became apparent to the Italian navy that the earlier ships were much too small for their assigned tasks.*

USA

'Long Beach' class

The first US surface warship to have nuclear power, the USS *Long Beach* (CGN 9) was to have originally been frigate-sized but grew rapidly during design to the dimensions of a heavy cruiser. As built she had two twin long-range Talos SAM missile systems (with 52 missiles), two Terrier medium-range SAM systems (with 120 missiles) and what was then the revolutionary SPS-32/33 fixed-array air-search radar system with an early version of the NTDS data system. During the Vietnam War the *Long Beach* used her Talos missiles to attack MiGs on seven occasions during 1967-8 whilst they flew deep within North Vietnamese territory, shooting down two (in May and June 1968) at ranges of more than 120 km (75 miles). As a result of experiences in the Vietnam War the *Long Beach* had a conventional SPS-12 air-search radar fitted in 1968 to supplement the fixed arrays, and an integral IFF and digital Talos fire-control system were added in 1970. By 1979 the Talos system was becoming obsolete, so the launchers and radars were removed, two quadruple Harpoon SSM launchers being added. In the following year the inadequate fixed-array systems were removed and replaced by SPS-48 and SPS-49 radars, the original planar array panels being replaced on the superstructure by armour plate. Two 20-mm Phalanx CIWS mountings were also added, and the sonar was modified to improve its passive capabilities (without the need to add a second dome). In 1981 the Standard SM2-ER replaced the SM1-ER model that had been used since the late 1970s. During her next major refit in 1984-5 the *Long Beach* will have a Tactical Flag Command Center and additional Kevlar armour fitted. The *Long Beach* currently serves with the Pacific Fleet.

Specification

'Long Beach' class

Displacement: 15,540 tons standard and 17,525 tons full load

Dimensions: length 219.8 m (721.2 ft); beam 22.3 m (73.2 ft); draught 9.5 m (31.2 ft)

Propulsion: two Westinghouse C1W pressurized-water cooled reactors powering geared steam turbines delivering 80,000 shp (59655 kW) to two shafts

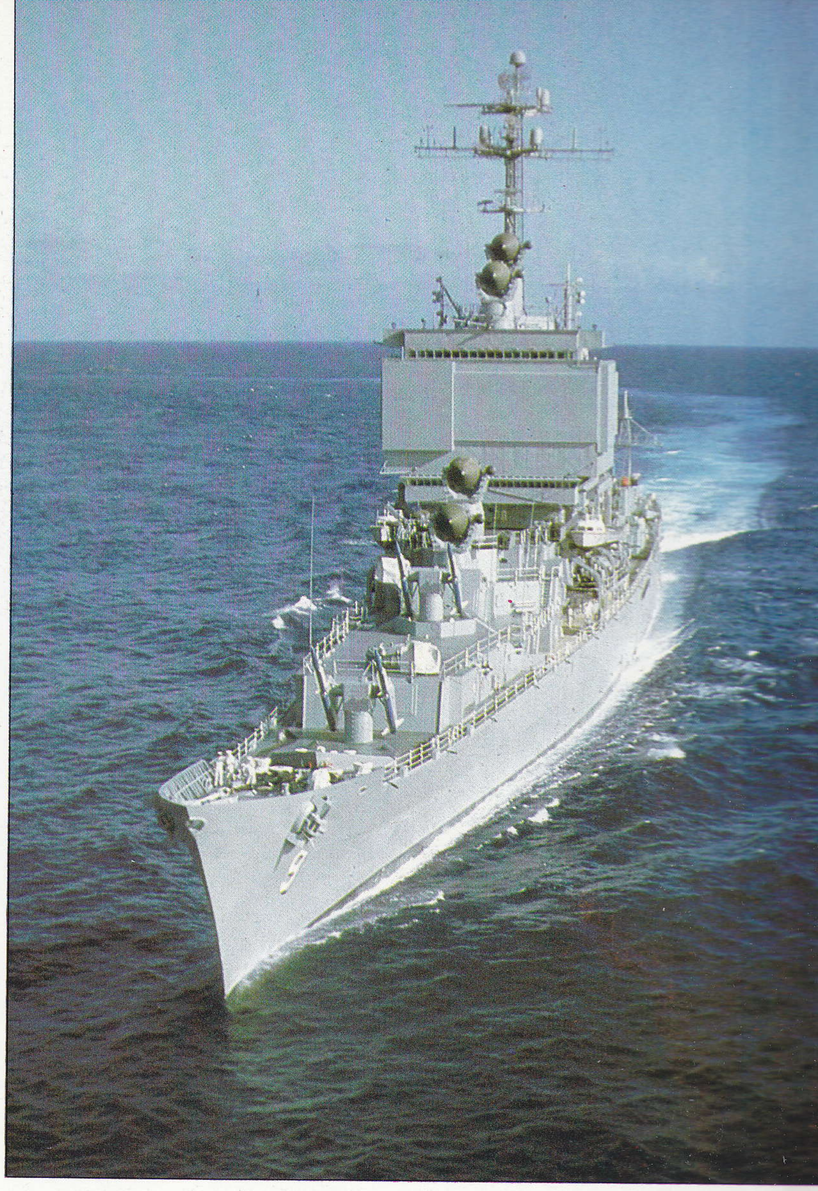
Speed: 36 kts

Complement: 1,160 plus flag accommodation of 68

Aircraft: none embarked, though a helicopter platform is provided

Armament: two quadruple Harpoon SSM launchers with eight missiles, two twin Standard SM2-ER SAM launchers with 120 missiles, one octuple ASROC ASW launcher with 20 missiles, two 127-mm (5-in) DP guns, two 20-mm Phalanx CIWS mountings, and two triple 324-mm (12.75-in) Mk 22 ASW torpedo tube mountings with six Mk 46 torpedoes

Electronics: one SPS-48C 3D radar, one SPS-10 surface-search radar, one SPS-49B air-search radar, four SPG-55A Standard fire-control radars, two SPG-49 gun fire-control radars, two SPW-2 fire-control radars, one NTDS equipment, one ESM suite, Mk 36 Super RBOC chaff launchers, and one SQQPAIR-23 sonar

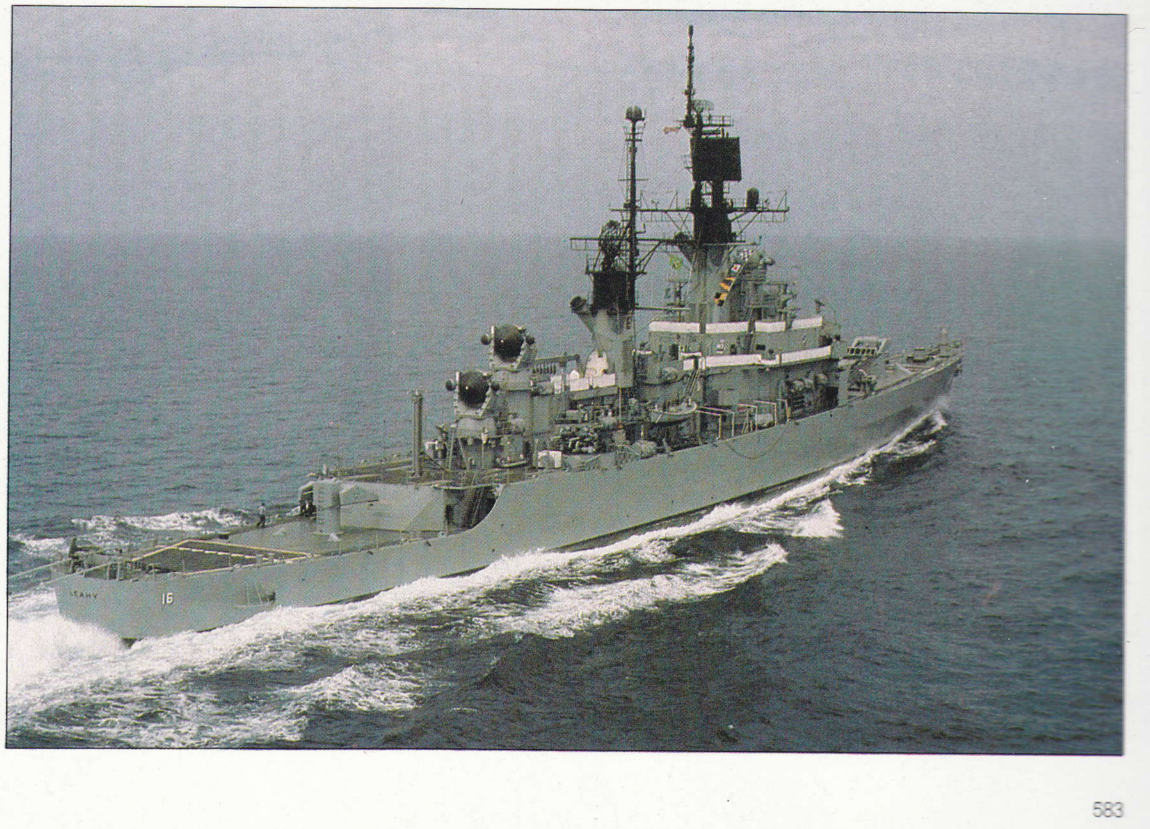


USS* Long Beach *(CGN 9) was the first US surface warship to have nuclear power. During the Vietnam War in 1967-8 her long range Talos SAM systems engaged North Vietnamese MiGs on seven occasions, shooting down two at ranges in excess of 120 km (75 miles).

USA

'Leahy' and 'Bainbridge' classes

The 'Leahy' class was the first American warship design with the SAM missile as primary armament, with two twin 76-mm (3-in) guns added almost as an afterthought. The SAM launchers are two twin Mk 10 Terrier launchers fore and aft, the former being protected in heavy seas by the knuckling of the hull (a feature previously unseen in US ships). The ASW outfit was limited as the ships' primary mission is anti-war warfare defence. The nine ships are the USS ***Leahy*** (CG 16), USS ***Harry E. Yarnell*** (CG 17), USS ***Worden*** (CG 18), USS ***Dale*** (CG 19), USS ***Richmond K. Turner*** (CG 20), USS ***Gridley*** (CG 21), USS ***England*** (CG 22), USS ***Halsey*** (CG 23) and USS ***Reeves*** (CG 24), all commissioned between 1962 and 1964 and in their careers these have all undergone extensive modernization, an NTDS data system being fitted, the missile fire-control systems being upgraded for the Standard SM1-ER (later SM2-ER) missile, two quadru-



The lead ship of the class, USS* Leahy *(CG 16). In the latter part of the Vietnam war her sister ship, USS* Worden, *was hit accidentally by Shrike ARMs (Anti-Radiation Missiles) fired from US Navy planes. The missiles destroyed her fighting capability without damaging her sailing abilities.

The nuclear-powered cruiser USS Bainbridge *(CGN25) executes a high-speed turn to port.* Bainbridge *is essentially similar to the 'Leahy' class cruisers, but has larger dimensions and tonnage to accommodate the two D2G pressurized-water cooled reactors that give her a 38 kts speed.*

ple Harpoon launchers being fitted, and the 76-mm (3-in) mountings being replaced by two 20-mm Phalanx CIWS mountings.

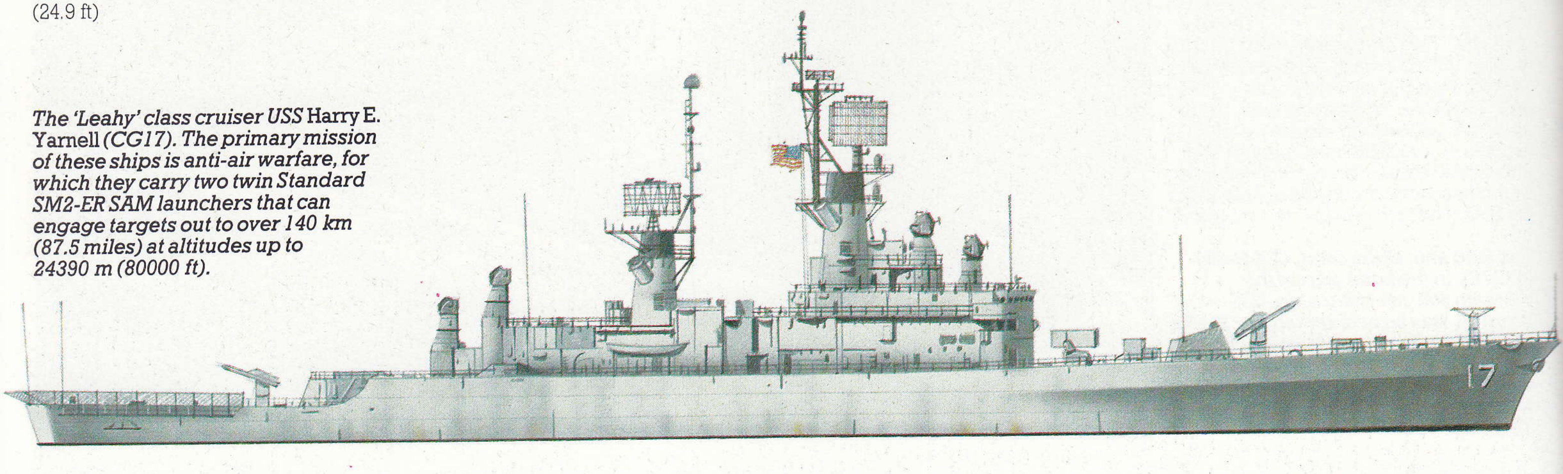
At the same time as the 'Leahy' class cruisers were built a single nuclear-powered variant was also constructed in the form of the USS *Bainbridge* (CGN 25). She is essentially similar, but larger in dimensions and tonnage to accommodate the nuclear powerplant. Three of the 'Leahy' class cruisers serve with the Atlantic Fleet whilst the remainder (plus the *Bainbridge*) are with the Pacific Fleet.

Specification
'Leahy' class

Displacement: 5,670 tons standard and 8,203 tons full load
Dimensions: length 162.5 m (533.0 ft); beam 16.7 m (54.8 ft); draught 7.9 m (24.9 ft)
Propulsion: geared steam turbines delivering 85,000 shp (63385 kW) to two shafts
Speed: 32.7 kts
Complement: 431
Aircraft: none embarked, though a helicopter platform is provided
Armament: two quadruple Harpoon SSM launchers with eight missiles, two twin Standard SM2-ER SAM launchers with 80 missiles, one octuple ASROC ASW launcher with eight missiles, two 20-mm Phalanx CIWS mountings, and two 324-mm (12.75-in) Mk 32 ASW torpedo tube mountings with 12 Mk 46 torpedoes
Electronics: one SPS-48A 3D radar, one SPS-49 air-search radar, one SPS-10F surface-search radar, four SPG-55B Standard fire-control radars, one URN-20 TACAN, one SLQ-32(V)2 ESM suite, four Mk 36 Super RBOC chaff launchers, and one SQS-23B PAIR sonar

Specification
'Bainbridge' class

Displacement: 7,804 tons standard and 8,592 tons full load
Dimensions: length 172.2 m (565.0 ft); beam 17.6 m (57.75 ft); draught 7.7 m (25.25 ft)
Propulsion: two General Electric D2G pressurized-water cooled reactors powering geared steam turbines delivering 60,000 shp (44740 kW) to two shafts
Speed: 38 kts
Complement: 488
Aircraft: none embarked, though a helicopter platform is provided
Armament: two quadruple Harpoon SSM launchers with eight missiles, two twin Standard SM2-ER SAM launchers with 80 missiles, one octuple ASROC ASW launcher with eight missiles, two 20-mm Phalanx CIWS mountings, and two 324-mm (12.75-in) Mk 32 ASW torpedo tube mountings with 12 Mk 46 torpedoes
Electronics: one SPS-52 3D radar, one SPS-49 air-search radar, one SPS-10F surface-search radar, four SPG-55B Standard fire-control radars, one URN-20 TACAN, one SLQ-32(V)2 ESM suite, four Mk 36 Super RBOC chaff launchers, and one SQS-23 sonar



The 'Leahy' class cruiser USS Harry E. Yarnell *(CG17). The primary mission of these ships is anti-air warfare, for which they carry two twin Standard SM2-ER SAM launchers that can engage targets out to over 140 km (87.5 miles) at altitudes up to 24390 m (80000 ft).*

AEGIS

AEGIS is the most advanced of the modern anti-air warfare systems in use with the US Navy, and is designed to protect the Carrier Battle Group from the threat of anti-ship missiles (both sea-skimming and terminally diving). AEGIS provides central command and control capacity to the entire Battle Group, and greatly enhances the effect of the layered defence concept.

Aerial attack has, for over 40 years, posed the gravest threat to a surface warship, which may now have to face simultaneous assault not only from one or more aircraft but also from anti-ship missiles, either hugging the wavetops or diving from altitude. Despite parallel SAM development to meet these threats, the ship's area-defence and point-defence SAM systems are still very limited in the number of simultaneous targets that can be engaged. This results from the fact that onboard restrictions in space and weight mean that current SAMs can carry only a radar receiver to home the missile onto energy reflected from the target by a ship-mounted illuminator radar. Such semi-active weapons demand the service of an illuminator until the missile is close enough to the target for onboard acquisition by means of a close-range IR-seeker or comparable system. Only then can the ship's directors address a new target and more weapons be launched. Co-ordinated attack from more platforms than can be engaged simultaneously by the ship will, therefore, saturate her defences, with probably disastrous results to the ship.

With a 'layered' defence, such as can be offered by a carrier attack group, saturation is less likely but, to avoid the inevitable confusion resulting from a well co-ordinated attack, a centralized defensive control is essential. Such a control needs ideally to be capable of detecting and tracking all possible targets or threats, maintaining a continuously-updated plot, identifying friend from foe, assessing the threat posed by each of the latter in order of priority, maintaining a dialogue with other friendly platforms, allocating their defensive systems, and controlling both friendly missiles and aircraft. Input data would be from the ship's own sensors and those of other platforms.

Such a task demands powerful computer back-up to collate, assess and update on a continuous basis, displaying the solution in a form suitable for immediate human reaction or comparing it with established data for automatic operation.

To track several hundred targets simultaneously demands radars with highly precise beams, working in three dimensions to give bearing, height and range. Rotating antennae focus energy from a radiation source and project it as a beam whose sharpness and intensity is limited by design constraints. The antennae are heavy and rotate slowly compared with the crossing rate of high-speed aerial targets. As they need stabilization to be fully effective, they become very heavy items set high in the ship.

Phased arrays, on the other hand, consist of matrices of individually-radiating elements ('phase-shifters'), with one matrix covering each quadrant. Everything is fixed and can be mounted closer to the waterline. Groups of elements are electronically switched in turn to produce energy beams that can be shaped, swept at very high rates and moved in any three-dimensional pattern to suit a given situation.

The first system to move in this direction was the Hughes SPS-32/SPS-33 FRESCAN put into the carrier USS *Enterprise* and cruiser USS *Long Beach*, pioneer nuclear-powered warships of the late 1950s. Though the system worked, it was highly expensive and not developed further. Another attempt, the Westinghouse SPG-59 Typhon was abortive, and the system finally adopted was AEGIS, based on the RCA/Raytheon SPY-1A set, whose 'Y' suffix emphasized its multi-function aspect as opposed to the earlier sets' 'G' for fire control and 'S' for search.

While the prototype AEGIS system was being sea-tested, from 1974, the US Navy's chosen vehicle, the nuclear strike cruiser, was axed. As the uprated CGN 42 version of the 'Virginia' class is yet some time off, the 'Spruance'-based CG 47s are the first operational AEGIS ships. The lead ship, the USS *Ticonderoga*, commissioned in 1983 and a class of 24 is planned.

These ships have two arrays set at each end of the bulky superstructure. Each array is a 13.32-m^2 (143.4 sq ft) matrix containing 4,080 separate phase-shifters. Each array is fed by its own radio-frequency generator, and the total power output is several megawatts. Designed to work in conditions of extreme electronic clutter rather than for maximum range, the SPY-1A is supplemented by other radars, one SPS-49 to give high-definition aerial targeting at long range and a brace of SPG-62s slaved to the main set to provide terminal target-illumination for the ship's Standard SM2 surface-to-air missiles. These weapons also have an anti-ship capability out to horizon range, supplementing the Harpoons. It is planned to achieve sufficient accuracy with primary targeting to place a missile close enough to a target to render auxiliary terminal illumination unnecessary.

The continuously-updated plot is sited in the ship's Combat Information Center (CIC). Currently, although other vehicles can be controlled from this by means of the standard data-link, their weapons systems cannot actually be activated by the AEGIS ship. This facility is under development. With even the present capacity of tracking 200-plus targets, the AEGIS' main problem would appear to be IFF (Identification, Friend or Foe).

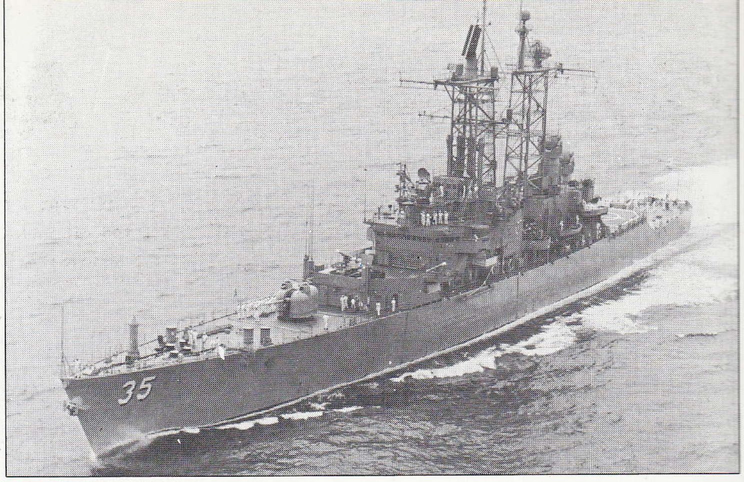
Outer-ring defence of a task group is a job for destroyers, and the currently-planned DDG 51 'Arleigh Burke' class will have a simplified version of AEGIS to improve the defence further.

By the time AEGIS is mature, the weapons system of the entire fleet will be under central control, and AEGIS will launch missiles from the ship closest to the threat or that most suited for the task required.

USA

'Belknap' and 'Truxtun' classes

The 'Belknap' class suffered a very long and tortuous development history even by American standards, being redesigned on a number of occasions as the costs gradually increased. The design eventually stabilized as a single-ended missile ship with facilities for the DASH ASW drone anti-submarine helicopter hangar and a single 127-mm (5-in) DP gun at the other end. The nine ships are the USS ***Belknap*** (CG 26), USS ***Josephus Daniels*** (CG 27), USS ***Wainwright*** (CG 28), USS ***Jouett*** (CG 29), USS ***Horne*** (CG 30), USS ***Sterett*** (CG 31), USS ***William H. Standley*** (CG 32), USS ***Fox*** (CG 33) and USS ***Biddle*** (CG 34). Since completion between 1964 and 1967 the class has been used as trials ships for a number of new systems: for example, the *Wainwright* was the test ship for the first NTDS data system integrated into a fire-control system and for the Standard SM2-ER missile, whilst the *Fox* evaluated the Tomahawk cruise missile box-launcher arrangement. On 22 November 1975 the *Belknap* suffered very severe fire damage following collision with the carrier USS *John F. Kennedy* in the Mediterranean, and had to be towed back to the USA for rebuilding. Before that time several of the *Belknap*'s sister ships had accumulated great combat experience in the Vietnam War both as combat air patrol fighter-guidance controllers and as air-defence ships. The 1972 North Vietnamese invasion of South Vietnam and the subsequent American bombing, mining and naval bombardment of North Vietnam coastal areas resulted in two air attacks on the American fleet that involved 'Belknap' class ships. The first, on 19 April 1972, saw the *Sterret* fighting off a combined air and surface attack on a gunfire support group, her Terrier missiles destroying a 'Styx' SSM (the first occasion on which a SAM was used to destroy an anti-ship cruise missile in combat) and two MiGs (one at 9-km/5.6-mile range and the other at 27.5-km/17-mile range). Later, on 19 July, the *Biddle* engaged an incoming raid of five MiGs attempting a night attack on Task Force 77 off the North Vietnamese coast, her Terriers shooting down two MiGs at about 32 km (20 miles) and driving the rest off. As had occurred with the 'Leahy' class, a larger and nuclear-powered version of the 'Belknap' class ships was constructed, the USS *Truxtun* (CGN 35), basically similar in weapon and electronic fits. The deployment pattern of the class is similar to that of the 'Leahy' class, with the nuclear-powered version in the Pacific Fleet as the partner to the *Bainbridge*.



The sole nuclear powered version of the 'Belknap' class is USS **Truxtun** ***(CGN35). She normally operates in the American Pacific Fleet as the partner to USS*** **Bainbridge** ***escorting a nuclear-powered carrier.***

Specification

'Belknap' class

Displacement: 6,570 tons standard and 8,200 tons full load (CG 27, CG 28 and CG 29) or 8,065 tons full load (others)

Dimensions: length 166.7 m (547.0 ft); beam 16.7 m (54.8 ft); draught 8.8 m (28.8 ft)

Propulsion: geared steam turbines delivering 85,000 shp (63385 kW) to two shafts

Speed: 32.5 kts

Complement: 511 (CG 26) or 443 (others)

Aircraft: one Kaman SH-2D Seasprite multi-role helicopter

Armament: two quadruple Harpoon SSM launchers with eight missiles, one twin Standard SM2-ER/ASROC SAM/ASW launcher with 40 Standard and 20 ASROC missiles, one 127-mm (5-in) DP gun, two 20-mm Phalanx CIWS mountings, and two triple 324-mm (12.75-in) Mk 32 ASW torpedo tube mountings with 12 Mk 46 torpedoes

Electronics: one SPS-48A or SPS-48C 3D radar, one SPS-40 or SPS-49 air-search radar, one SPS-10 surface-search radar, one LN66 navigation radar, two SPG-55D Standard fire-control radars, one SPG-53A 127-mm (5-in) fire-control radar, one URN-20 TACAN, one NTDS equipment, one SLQ-32(V)2 ESM suite, four Mk 36 Super RBOC chaff launchers, and one SQS-26BX sonar (except CG 26, which has SQS-53)

Specification

'Truxtun' class

Displacement: 8,200 tons standard and 9,127 tons full load

Dimensions: length 171.9 m (564.0 ft); beam 17.7 m (58.0 ft); draught 9.5 m (31.2 ft)

Propulsion: two General Electric D2G pressurized-water cooled reactors powering geared steam turbines delivering 60,000 shp (44740 kW) to two shafts

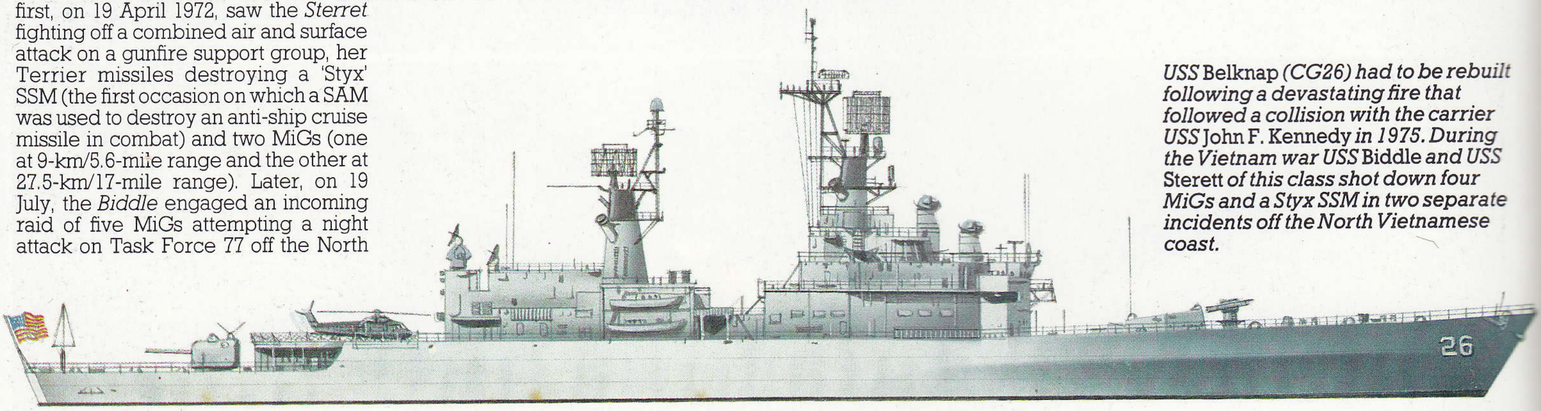
Speed: 38 kts

Complement: 528

Aircraft: one Kaman SH-2D Seasprite multi-role helicopter

Armament: two quadruple Harpoon SSM launchers with eight missiles, one twin Standard SM2-ER/ASROC SAM/ASW launcher with 40 Standard and 20 ASROC missiles, one 127-mm (5-in) DP gun, two 20-mm Phalanx CIWS mountings, and two triple 324-mm (12.75-in) Mk 32 ASW torpedo tube mountings with 12 Mk 46 torpedoes

Electronics: one SPS-48 3D radar, one SPS-40 air-search radar, one SPS-10 surface-search radar, one LN66 navigation radar, two SPG-55B Standard fire-control radars, one SPG-53F 127-mm (5-in) fire-control radar, one URN-20 TACAN, one NTDS equipment, one SLQ-32(V)3 ESM suite, four Mk 36 Super RBOC chaff launchers, and one SQS-26BX sonar



USS **Belknap** ***(CG26) had to be rebuilt following a devastating fire that followed a collision with the carrier USS*** **John F. Kennedy** ***in 1975. During the Vietnam war USS*** **Biddle** ***and USS*** **Sterett** ***of this class shot down four MiGs and a Styx SSM in two separate incidents off the North Vietnamese coast.***

USA

'California' class

Intended originally to have been a five-ship nuclear-powered guided-missile frigate version of the ill-fated Fiscal Year 1966 conventionally-powered guided-missile destroyer design, the 'California' class was cut back to only two vessels, the USS ***California*** (CGN 36) and USS ***South Carolina*** (CGN 37), the money for the others going towards the follow-on 'Virginia' class. The 'California' class ships were commissioned in 1974 and 1975, and were the first to have the improved D2G reactor systems with three times the core life of the original plant fitted in the USS *Bainbridge* and USS *Truxtun*. A helicopter landing pad is provided, but no hangar or maintenance facilities are fitted. Two torpedo tubes for the Mk 48 heavyweight ASW torpedo were also fitted in the transom, but these were discarded together with the original heavy Mk 42 127-mm (5-in) gun mounts, the latter being replaced by a pair of Mk 45 lightweight 127-mm (5-in) mountings. Under modernization plans two Phalanx CIWS mountings will be fitted, together with Kevlar plastic armour and Tomahawk SSM. The ships serve as a pair with the Atlantic Fleet as escort to a nuclear-powered aircraft-carrier.

The main SAM battery comprises two single-rail Mk 13 launchers with SPG-51D digital fire-control radars; the missile is the Standard SM1-MR. Harpoon SSM launchers have already been fitted, and the main ASW armament is provided by a reloadable eight-round Mk 16 ASROC launcher. The Standard SM2-MR will be carried as and when the launcher and fire-control systems are converted for it.

Specification

'California' class (as modified)

Displacement: 9,561 tons standard and 11,100 tons full load (CGN 36) or 10,473 tons full load (CGN 37)

Dimensions: length 181.7 m (596.0 ft); beam 18.6 m (61.0 ft); draught 9.6 m (31.5 ft)

Propulsion: two General Electric D2G pressurized-water cooled rectors powering geared steam turbines delivering 60,000 shp (44740 kW) to two shafts

Speed: 39 kts

Complement: 563

Aircraft: none embarked, though a helicopter platform is provided

Armament: two quadruple Tomahawk SSM launchers with eight missiles, two quadruple Harpoon SSM launchers with eight missiles, two single Standard SM2-MR SAM launchers with 80 missiles, one octuple ASROC ASW launcher with 24 missiles, two 127-mm (5-in) DP guns, two 20-mm Phalanx CIWS mountings, and four single 324-mm (12.75-in) Mk 32 ASW torpedo tubes with 16 Mk 46 torpedoes

Electronics: one SPS-48A 3D radar, one SPS-40B air-search radar, one SPS-10 surface-search radar, four SPG-51D Standard fire-control radars, one SPQ-9A fire-control radar, one SPG-60 127-mm (5-in) fire-control radars, one URN-20 TACAN, one SLQ-32(V)3 ESM suite, one NTDS equipment, four Mk 36 Super RBOC chaff launcher, one SQS-26CX sonar, and one SATCOMM system

California in Action

Designed to be the close-in defence for a nuclear-powered aircraft carrier, USS **California** ***gives the impression of being under-armed, especially to those used to the weapon-bristling cruisers of World War II. This is not strictly the case, as the vessel's stark appearance gives little idea of the power of the modern nuclear cruiser.***

In its classic gun-armed form, the cruiser was intended usually for long-endurance independent operation, having a direct ancestry in the sailing frigate. The navies subscribing to this concept of cruisers employed them usually in connection with trade: the British, for instance, used such ships in defence of trade and the Soviets, in the conventional cruiser's final expression, the 'Sverdlov' class ships, in its destruction.

By way of contrast, other major fleets were concerned little with trade and business of empire, using cruisers as a more integral part of the main body of the fleet. Such was the American concept.

Whatever concepts had been cherished, many were summarily rendered obsolete by experience in World War II, particularly the idea of the 'balanced fleet' and its composition, organization and use. For more than a decade, however, these profound lessons were hidden because major fleets 'made do' with a vast number of obsolescent, though quite new, war-built ships. There was no money for development and no potential maritime enemy to stimulate it.

This was the era of the Cold War, when the Stalin camp believed that the West was permanently on the brink of invasion, using its massive amphibious capability to outflank the Soviet armies in eastern Europe. These amphibious operations would need to be covered by the West's powerful carrier attack groups and, as these had also the means to deliver nuclear ordnance to Soviet soil, they were identified as the main target.

Most of a carrier's defensive capacity, and all of her power to take the offensive, is vested in her aircraft. Once this shield is pierced, she is almost totally dependent upon her escort for protection. In the Pacific during World War II, the Japanese succeeded on occasion by employing sufficient aircraft to saturate the defences, which included an outer ring of destroyers and an inner ring of cruisers, and even battleships, whose upperworks were festooned with small-calibre automatic weapons.

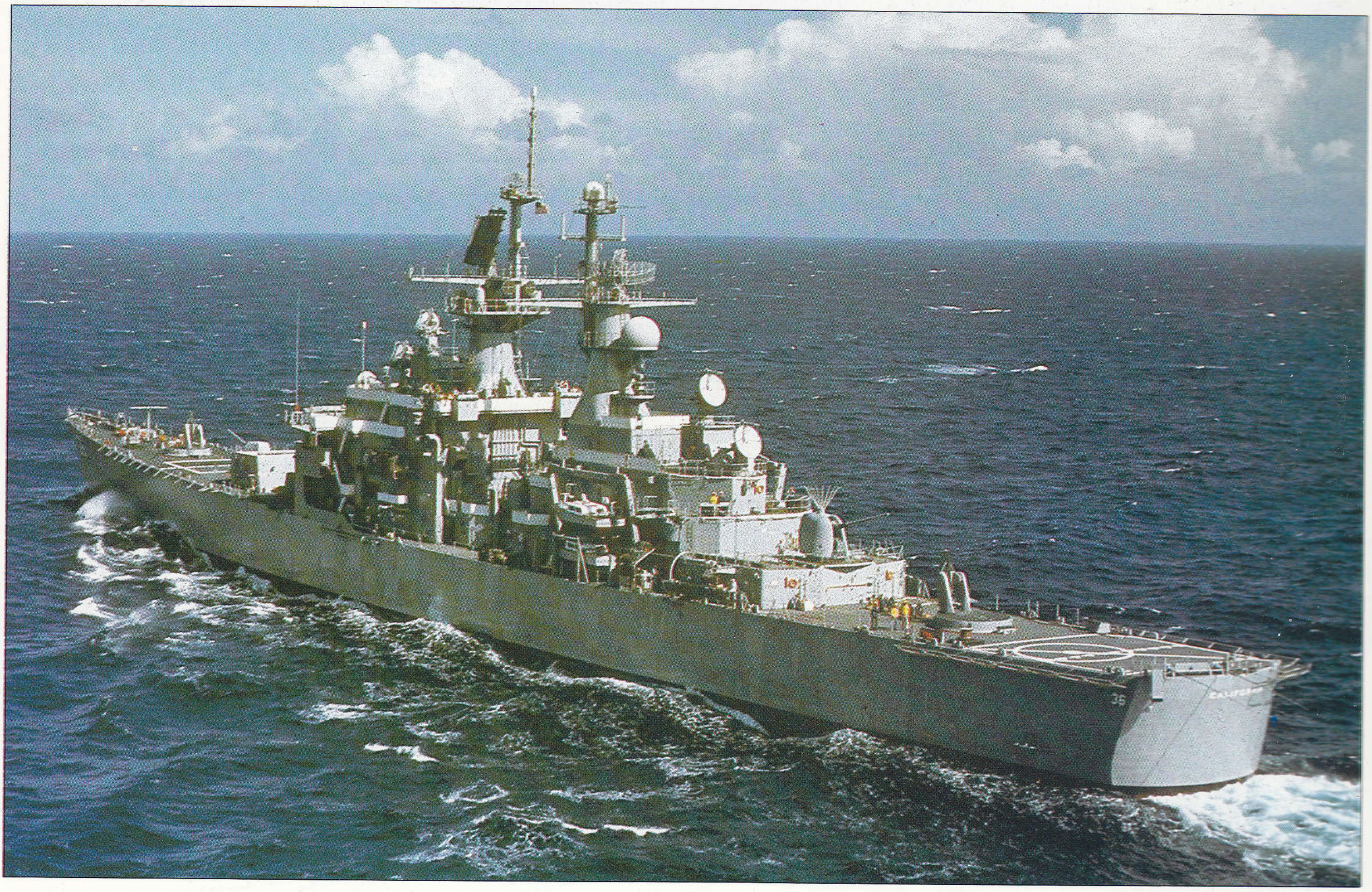
By the Cold War period, however, technology had modified the threat to stand-off missiles capable, theoretically, of a range of 400 km (250 miles), launched from a combination of surface ships and aircraft. With a carrier's combat air patrol lured away by a few such distant postures, a smartly-delivered conventional attack still had potency. The close-in escort was still required.

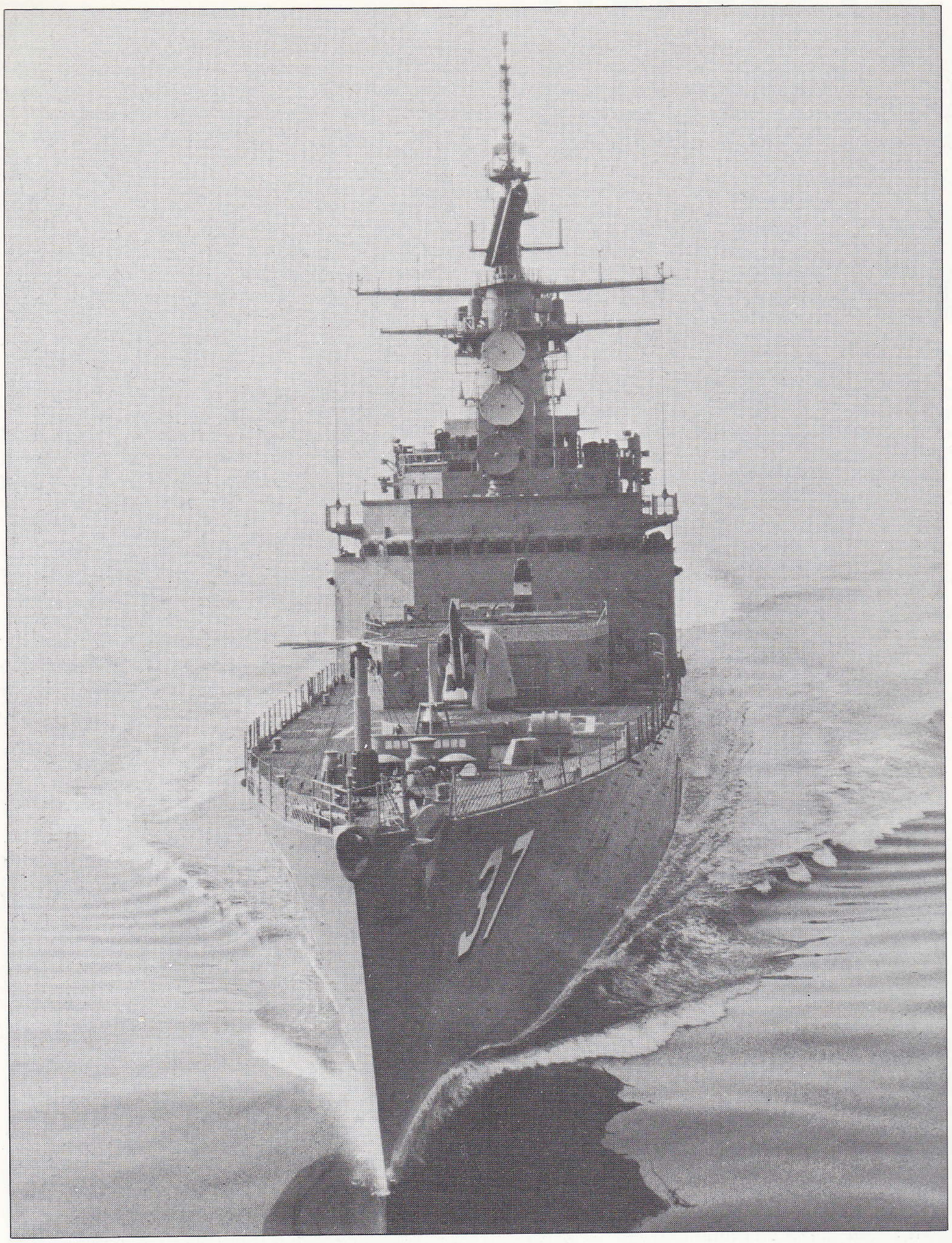
To give defence in depth, a family of SAMs was developed by the Americans: this comprised the 185-km (115.62-mile) Talos, capable of carrying a nuclear head for airburst, the 74-km (46.25-mile) Terrier and the 32.4-km (20.25-mile) Tartar. These were remarkably good weapons for their day but, unfortunately, war-built cruiser and destroyer hulls were not suitable and, therefore, highly expensive to convert for missile operations. Specialized new buildings were required.

Between 1959 and 1966, two groups of specialized escorts were built, the 'double-ended' 'Leahy' class for close-in 'goalkeeper' roles and the single-ended 'Belknap' class which, having enhanced ASW capacity, provided 'outer-ring' ships. As neither type resembled the still-numerous conventional cruisers and destroyers, they were labelled 'guided-missile frigates'. Significantly, one of each class (USS *Bainbridge* and USS *Truxtun*) was completed with nuclear propulsion, and these provided the basis for a pair of derivatives, 'stretched' by 10 m (33 ft).

The first of these, the USS *California* (DLGN 36) was laid down at Newport News in January 1970, followed within the year by a sister ship, the USS *South Carolina* (DLGN 37). Interestingly, the two ships carried destroyer designations though classed as frigates. As both were completely unlike the European concepts of

For the inner defence role USS **California** ***carries two single-rail Mk 13 SAM launchers for the Standard SM2-MR missile, which can engage targets out to 74 km (46.75 miles) at heights up to 24390 m (80,000 ft).***





Above: Bow view of California*'s sister ship, USS* South Carolina *(CGN37). The anchor is located well forward to clear the SQS-26CX sonar dome located underwater in the chin position.*

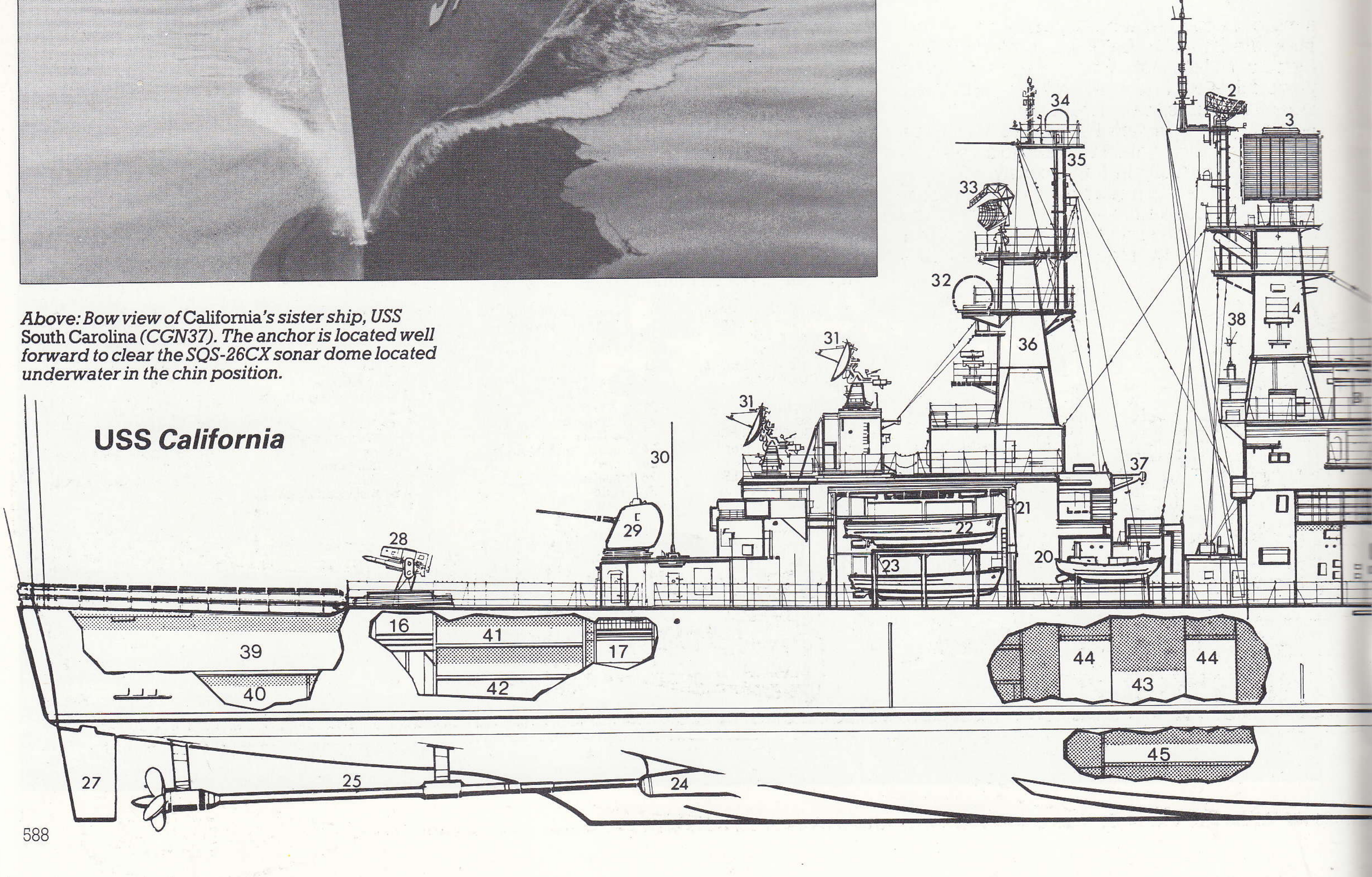
frigate design, they and comparable ships were reclassified as cruisers in 1975, a term more in keeping with their capabilities.

Similar to the earlier double-enders, the 'California' class ships were given a rather specialist 'close-in' role, a somewhat narrow specification that allowed for no helicopters, despite an 11,000-tonne displacement. The two ships have a rather bland appearance, with a featureless high-freeboard hull topped by a squat, two-block superstructure. Their inevitably underarmed appearance gives little idea of their true potency.

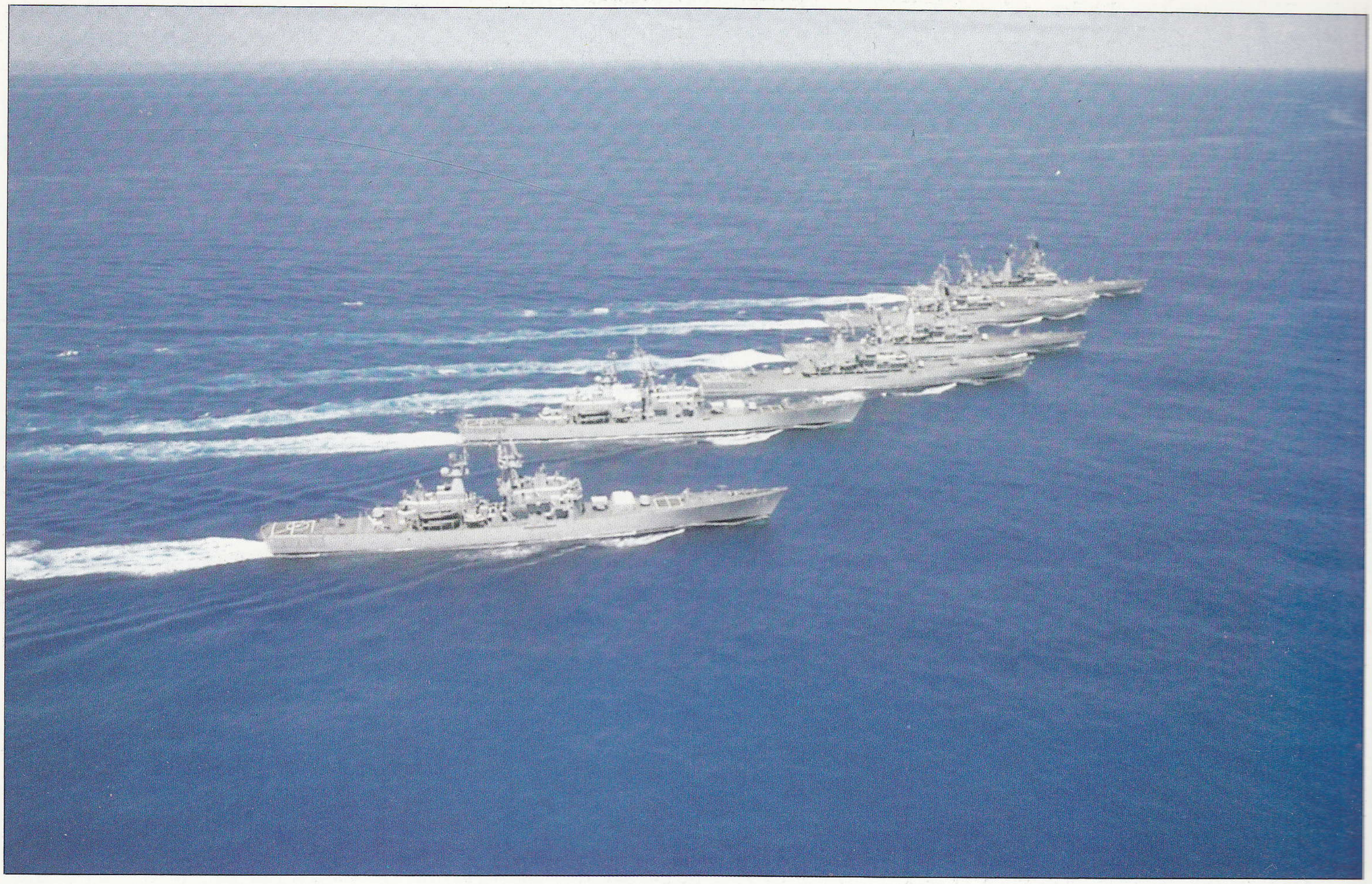
Missiles and fire control

Both forward and aft is a single-arm Mk 13 launcher for the Standard MR (Medium Range) surface-to-air missile, which replaced the Tartar. As this is essentially a close-range weapon, it must be assumed that volume of fire is the governing criterion, each launcher being sited above a rotating ring-type magazine with a 40-round capacity. With a speed of Mach 2.5 the missile has a flight time that even to maximum range cannot be much more than 40 seconds. Taken together with the need for simultaneous direction of the ship's two 127-mm (5-in) guns, this necessitates a fire-control system that is agile both electronically and physically. The Mk 86 system, introduced on the 'California' class, has since been used extensively on other classes, including the 'Tarawa' class amphibious assault ship and the 'Spruance' class destroyer.

Besides air defence, the Mk 86 can handle surface action and shore bombardment, together with subsidiary functions of navigation, command and control. It can interchange data with the majority of US naval ships through the Naval Tactical Data System (NTDS) and, on



USS *California*

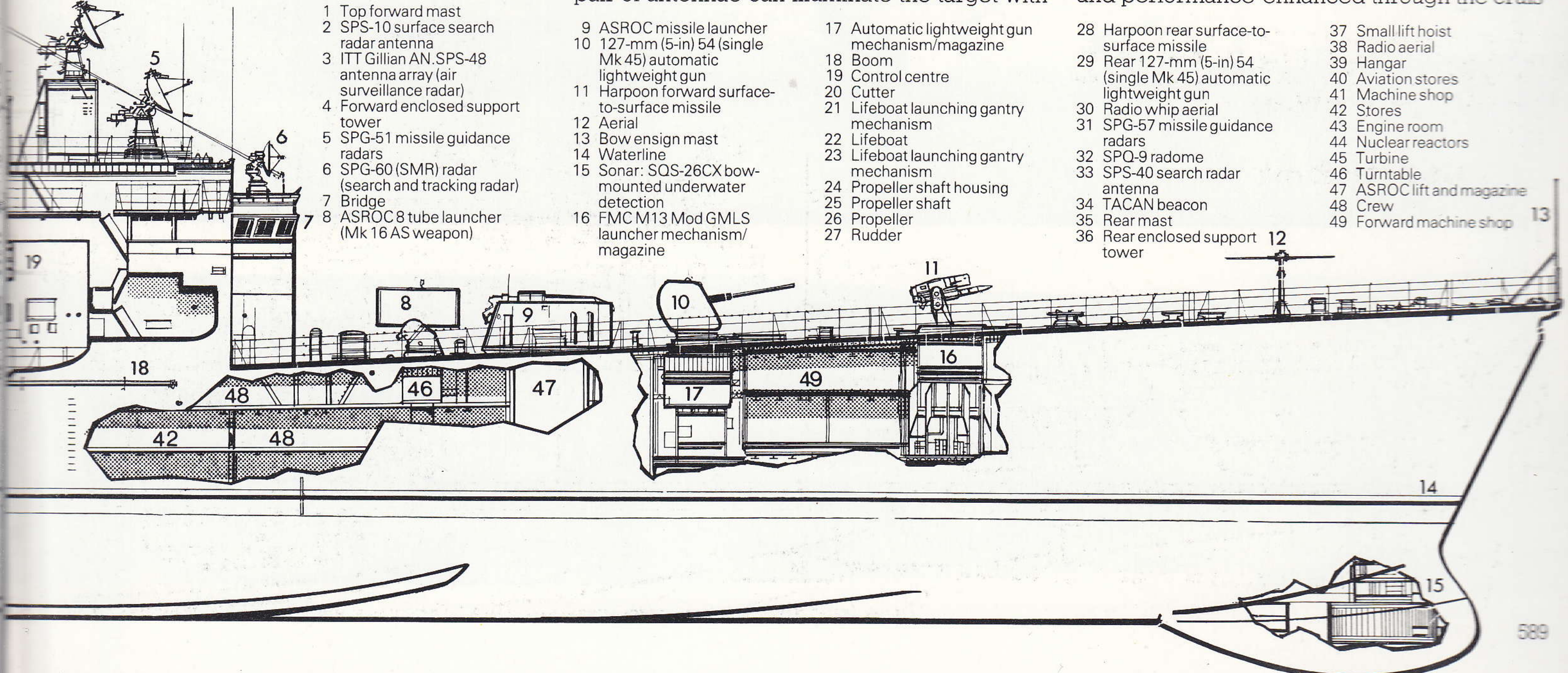


The two 'California' class (nearest to camera) and the four 'Virginia' class CGNs in company. The differences between the two classes are readily apparent, with the latter carrying twin-rail SAM launchers for the longer-range Standard SM2-ER missiles.

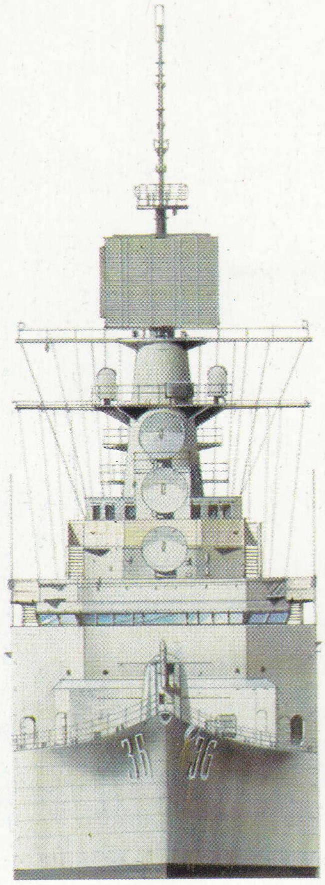
a more specialized support plane, through the Integrated Tactical Amphibious Warfare Data System (ITAWDS). Computer back-up is powerful enough to keep track of 120 simultaneous returns; separate aerial or surface targets can be engaged by each of the ship's weapon systems, which are able to switch to a new threat virtually instantaneously.

The Mk 86 system requires a variety of sensors. At the foremast head is the antenna of the SPS-48, tasked with three-dimensional air search. Beneath the radome on the mainmast is the rapidly-rotating antenna of the SPQ-7, which gives fast response against low-flying targets out to about 40 km (25 miles). The set is frequency-agile to counter ECM and other interference. The SPS-40 search antenna at the mainmast head can also give a measure of defence against the low flyer. Targets designated by these sets are acquired and tracked by the SPG-60 dish over the bridge. Abaft this antenna are the four SPG-51D dishes, a pair of which are associated with each Standard launcher. With tracking handled elsewhere, each pair of antennae can illuminate the target with great precision, one emitting a continuous energy wave and the other receiving the reflected signal, measuring the relative target speed by its Doppler shift.

With a 'California' class ship tucked in on either beam, a carrier is both well protected and performance-enhanced through the cruis-



1 Top forward mast
2 SPS-10 surface search radar antenna
3 ITT Gillian AN.SPS-48 antenna array (air surveillance radar)
4 Forward enclosed support tower
5 SPG-51 missile guidance radars
6 SPG-60 (SMR) radar (search and tracking radar)
7 Bridge
8 ASROC 8 tube launcher (Mk 16 AS weapon)
9 ASROC missile launcher
10 127-mm (5-in) 54 (single Mk 45) automatic lightweight gun
11 Harpoon forward surface-to-surface missile
12 Aerial
13 Bow ensign mast
14 Waterline
15 Sonar: SQS-26CX bow-mounted underwater detection
16 FMC M13 Mod GMLS launcher mechanism/ magazine
17 Automatic lightweight gun mechanism/magazine
18 Boom
19 Control centre
20 Cutter
21 Lifeboat launching gantry mechanism
22 Lifeboat
23 Lifeboat launching gantry mechanism
24 Propeller shaft housing
25 Propeller shaft
26 Propeller
27 Rudder
28 Harpoon rear surface-to-surface missile
29 Rear 127-mm (5-in) 54 (single Mk 45) automatic lightweight gun
30 Radio whip aerial
31 SPG-57 missile guidance radars
32 SPQ-9 radome
33 SPS-40 search radar antenna
34 TACAN beacon
35 Rear mast
36 Rear enclosed support tower
37 Small lift hoist
38 Radio aerial
39 Hangar
40 Aviation stores
41 Machine shop
42 Stores
43 Engine room
44 Nuclear reactors
45 Turbine
46 Turntable
47 ASROC lift and magazine
48 Crew
49 Forward machine shop



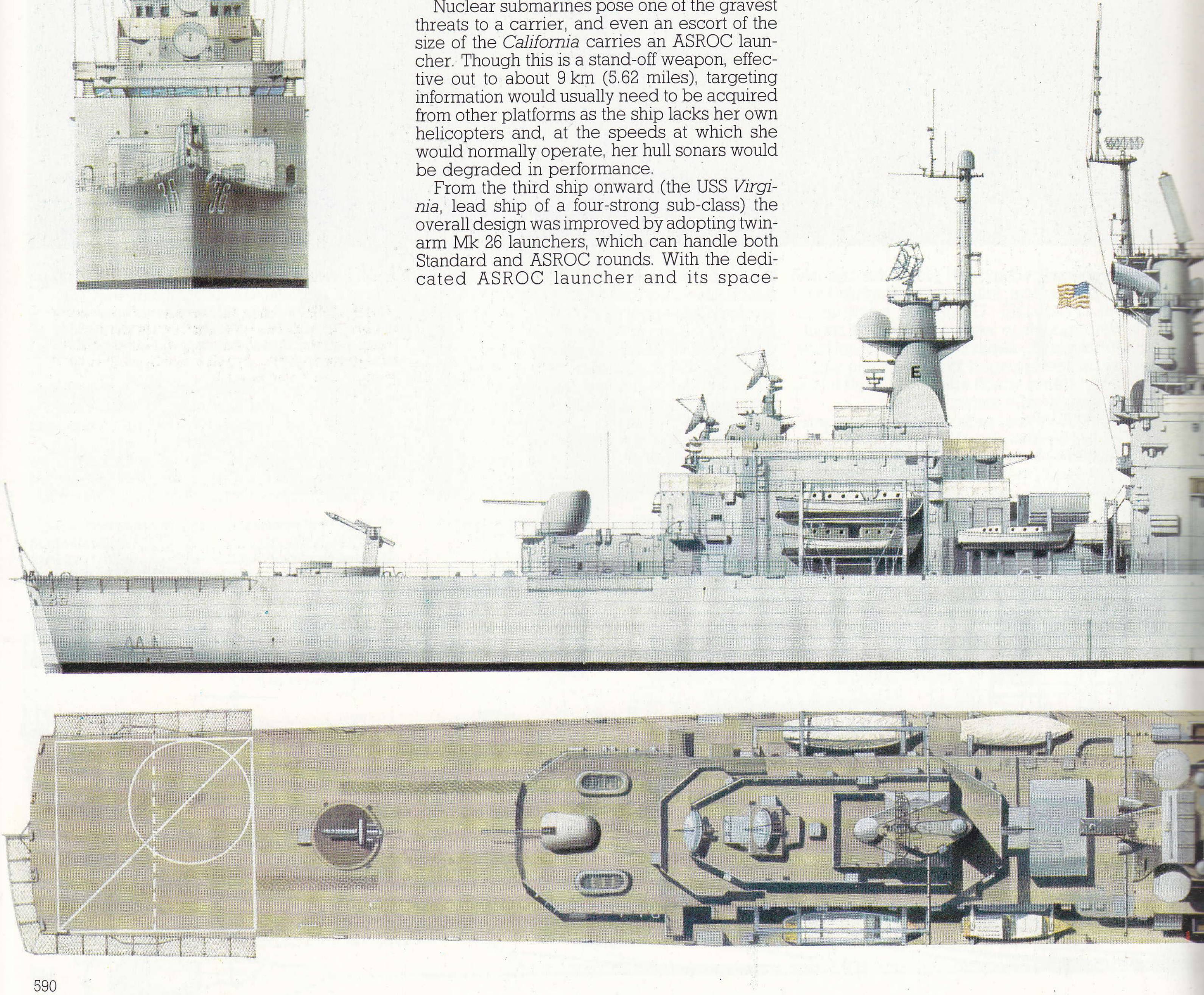
ers' additional sensors and data-links. While highly efficient in such a 'goalkeeper' role, knocking down threats to the carrier, the ships lacked until recently any additional capacity to guarantee the elimination of threats to themselves, typically a 'leaker' that penetrated the main defence ring. The Standard MR is viewed, it would seem, as suitable to double for a point-defence system, which is not fitted (even if it were, the standard Sea Sparrow is badly overdue for replacement). Two Vulcan-Phalanx CIWS mountings are due to be fitted. Even these fast-response and autonomous weapons have shortcomings. Current thinking favours a 25-mm or 30-mm CIWS that has the range and stopping power to explode or disintegrate a hardened SSM at a safe range; even with super-dense penetrators, the Vulcan's 20-mm projectiles are apparently on the puny side even if the extra rate of fire is taken into account. Current Vulcan mountings cannot elevate to an angle sufficiently high to combat the terminal diver, even though the ship's own Harpoon SSMs can use this attack technique.

Anti-submarine defences

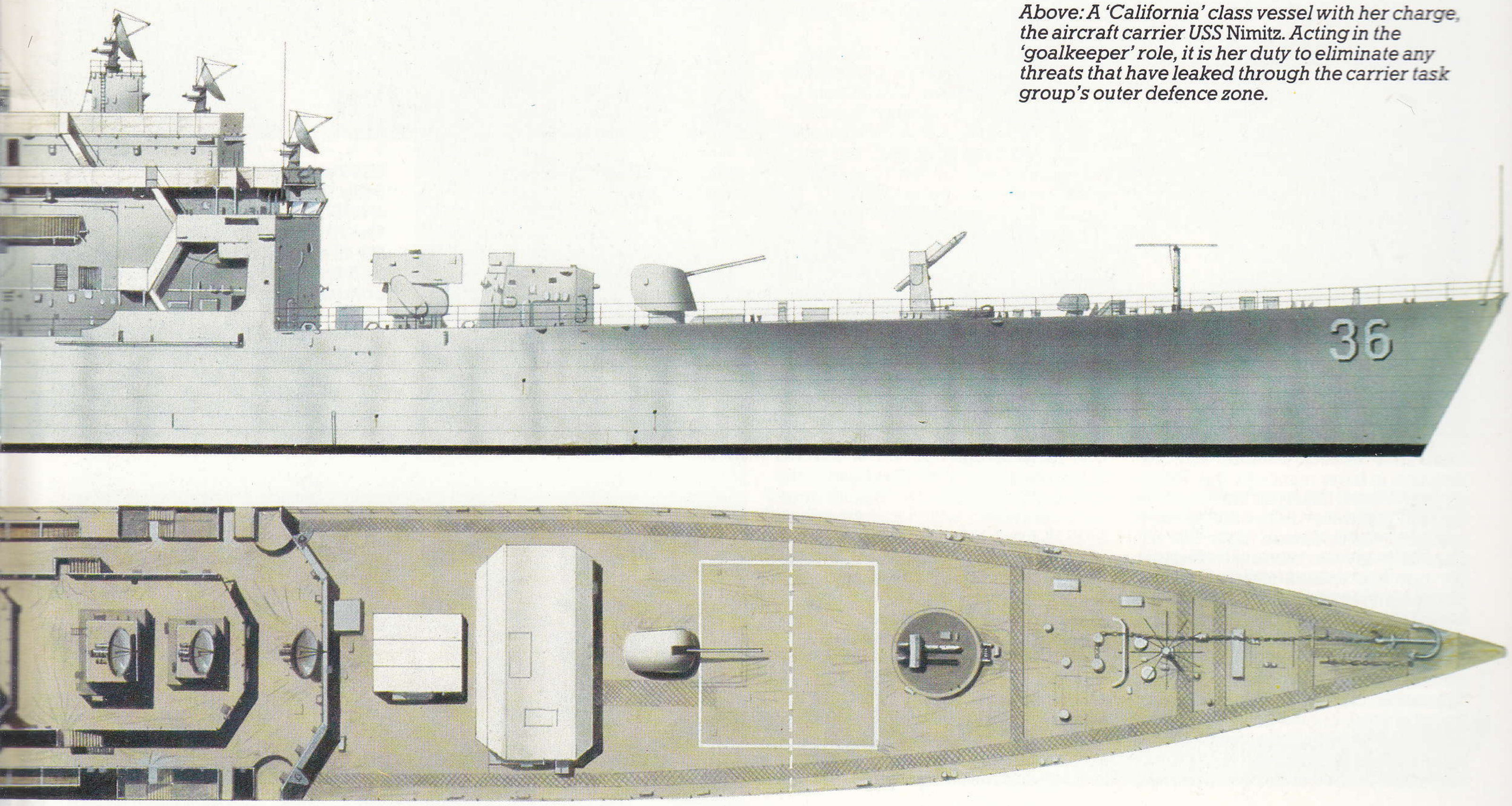
Nuclear submarines pose one of the gravest threats to a carrier, and even an escort of the size of the *California* carries an ASROC launcher. Though this is a stand-off weapon, effective out to about 9 km (5.62 miles), targeting information would usually need to be acquired from other platforms as the ship lacks her own helicopters and, at the speeds at which she would normally operate, her hull sonars would be degraded in performance.

From the third ship onward (the USS *Virginia*, lead ship of a four-strong sub-class) the overall design was improved by adopting twin-arm Mk 26 launchers, which can handle both Standard and ASROC rounds. With the dedicated ASROC launcher and its space-consuming reload facility removed, the superstructure could be sited farther forward and the space right aft given over to a large flight pad over an underdeck stowage for two LAMPS helicopters. Even with this addition, the 'Virginia' class ships are based on a hull some 3.35 m (11 ft) shorter than that of the 'California' class. Although this reduction graphically illustrates an improved layout, it is hardly defensible hydrodynamically and will prove a positive shortcoming when it comes to modernization.

Below: Although primarily an anti-air warfare ship, USS* California *also has a useful ASW armament in its SQS26CX low-frequency sonar (with a range of 18.28 km (11.36 miles) in the direct path and up to 64.02 km (39.78 miles) in the bottom-bounce or convergence-zone operating modes), ASROC missiles with either a 5 kt Mk 17 nuclear depth charge or a Mk 46 ASW torpedo as the payload, and torpedo-tube fired, 11-km (6.87-mile) range 45 kt Mk 46 torpedoes.

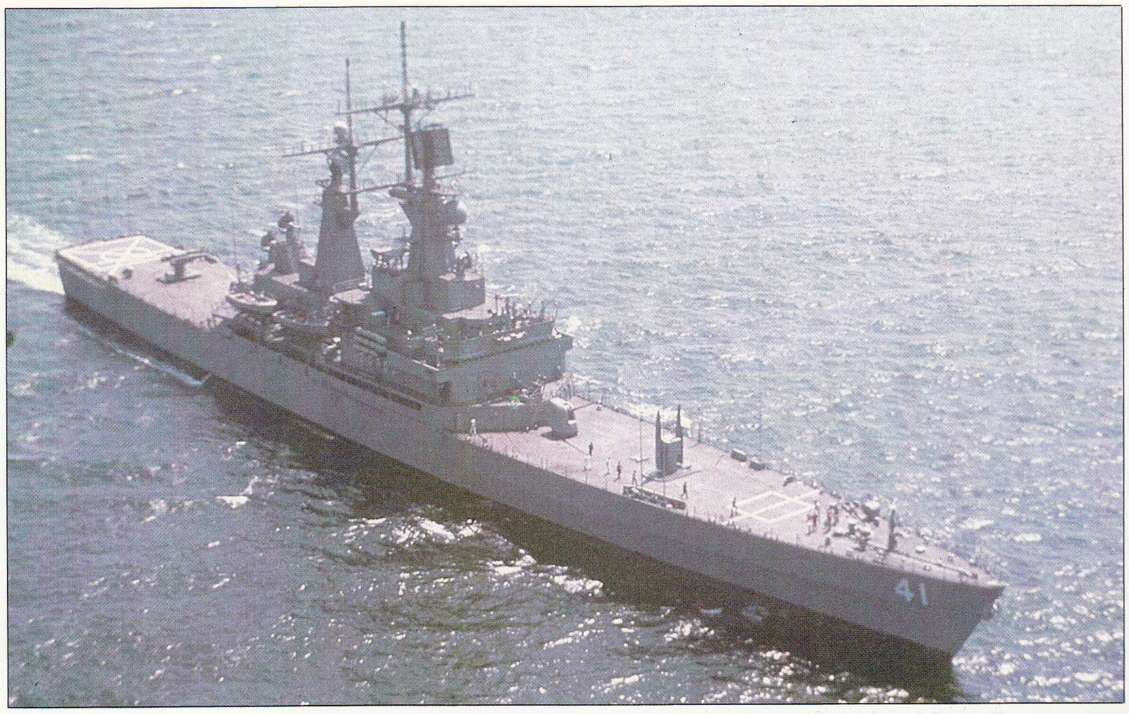


Above: A 'California' class vessel with her charge, the aircraft carrier USS Nimitz. *Acting in the 'goalkeeper' role, it is her duty to eliminate any threats that have leaked through the carrier task group's outer defence zone.*



USA

'Virginia' class



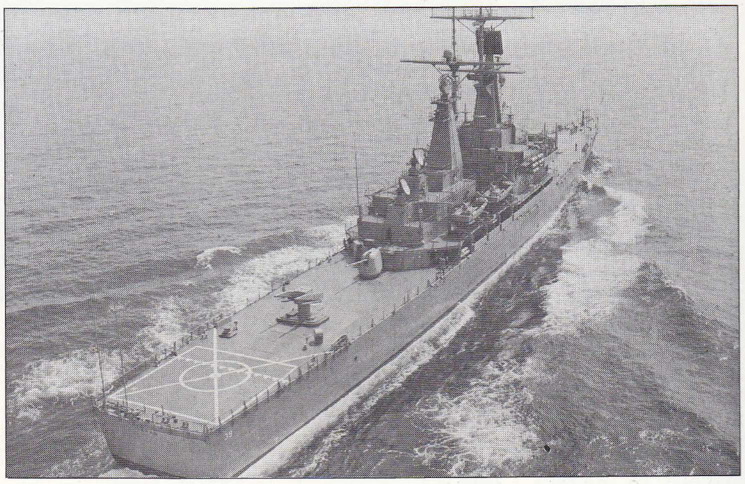
Above: Last of the 'Virginia' class to be completed was USS Arkansas *(CGN41). The 'Virginias' are smaller than the 'Californias' but have a much improved layout, including the provision of a hangar below decks for two LAMPS ASW helicopters.*

Initially intended as nuclear counterparts of the 'Spruance' class guided-missile destroyer design, the USS ***Virginia'*** (CGN 38), USS ***Texas*** (CGN 39), USS ***Mississippi*** (CGN 40) and USS ***Arkansas*** (CGN 41) eventually evolved into a slightly improved 'California' sub-class derivative, the 'Virginia' class. Like most guided-missile frigates (DLG or DLGN) they were redesignated as nuclear-powered guided-missile cruisers (CGN) during 1975, the ships commissioning between 1976 and 1980. A fifth unit was projected but not funded by the US Congress. Compared with the 'California' class ships they are some 3.35 m (11 ft) shorter, are fitted with two Mk 26 launcher systems for Standard SM1-ER SAMs, ASROC ASW missiles and, if required, Harpoon SSMs. They also have a hangar with telescoping hatch cover beneath the fantail flight deck and this is said to leak badly in heavy weather; the helicopter carried is a Kaman SH-2D Seasprite ASW type, and the ships will not be fitted for the Sikorsky SH-60B Seahawk follow-on ASW helicopter. The forthcoming SQR-19 tactical towed sonar array will not be fitted because of the ships' inherently noisy reactor machinery systems.

The normal role of the 'Virginia' class ships is deployment in pairs to act as fast area-defence SAM escorts to nuclear-powered aircraft-carriers. Currently one pair is assigned each to the Atlantic and Pacific Fleets. Under present modernization plans all four ships will have two Phalanx CIWS mountings fitted, the SAM system adapted to fire Standard SM2-ER missiles, Kevlar plastic armour fitted in vulnerable command and machinery spaces, and eight Tomahawk cruise missiles in launcher boxes added to supplement the Harpoon SSMs already carried. If funds are available a major class modification may later be undertaken to fit the AEGIS SPY-1D air-defence system from Fiscal Year 1987 onwards. A modified 'Virginia' class of CGN is due for construction in the late 1980s, with the vessels to commission between 1992 and 1995.

Specification

'Virginia' class (as modified)
Displacement: 8,623 tons standard and 10,420 tons full load
Dimensions: length 177.3 m (581.7 ft); beam 19.2 m (63.0 ft); draught 9.5 m (31.2 ft)
Propulsion: two General Electric D2G pressurized-water cooled reactors powering geared steam turbines delivering 70,000 shp (52,200 kW) to two shafts
Speed: 40 kts
Complement: 519
Aircraft: one Kaman SH-2D Seasprite multi-role helicopter (a second can be carried in emergencies)
Armament: two quadruple Harpoon SSM launchers with eight missiles, two quadruple Tomahawk SSM launchers with eight missiles, two twin Standard SM2-ER/ASROC SAM/ASW launchers with 50 Standard, 20 ASROC and two test missiles, two 127-mm (5-in) DP guns, two 20-mm Phalanx CIWS mountings, and two triple 324-mm (12.75-in) Mk 32 ASW torpedo tube mountings with 14 Mk 46 torpedoes
Electronics: one SPS-51D surface-search radar, one SPS-40B air-search radar, one SPS-48A or SPS-48C 3D radar, two SPG-51D Standard fire-control radars, one SPQ-9A fire-control system. one SPG-60D gun fire-control system, one URN-20 TACAN, one SLQ-32(V)3 ESM suite, four Mk 36 Super RBOC chaff launchers, one NTDS equipment, one SATCOMM system, and one SQS-53A sonar



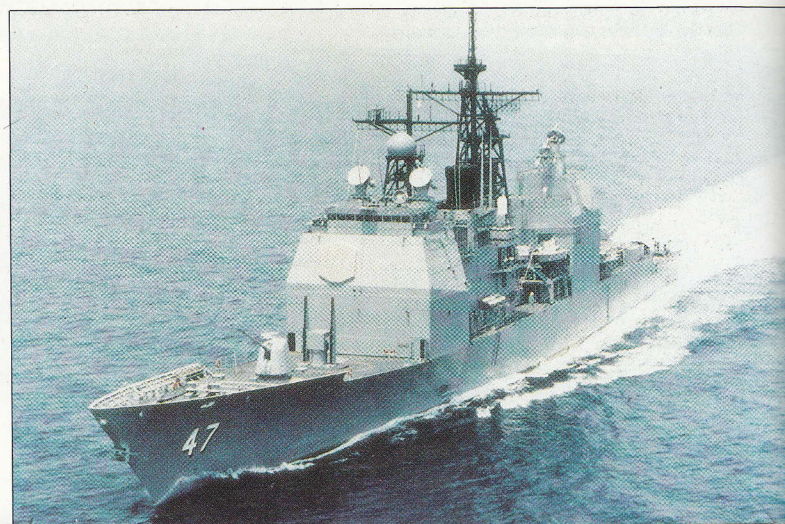
USS Texas *(CGN39) on constructor's trials. The fantail flight deck and rear Mk 26 SAM launcher are clearly seen. The 127 mm (5 in) gun mount is of the Mk 45 dual-purpose type, firing 31.8 kg (70-lb) rounds in the surface bombardment and anti-aircraft roles.*

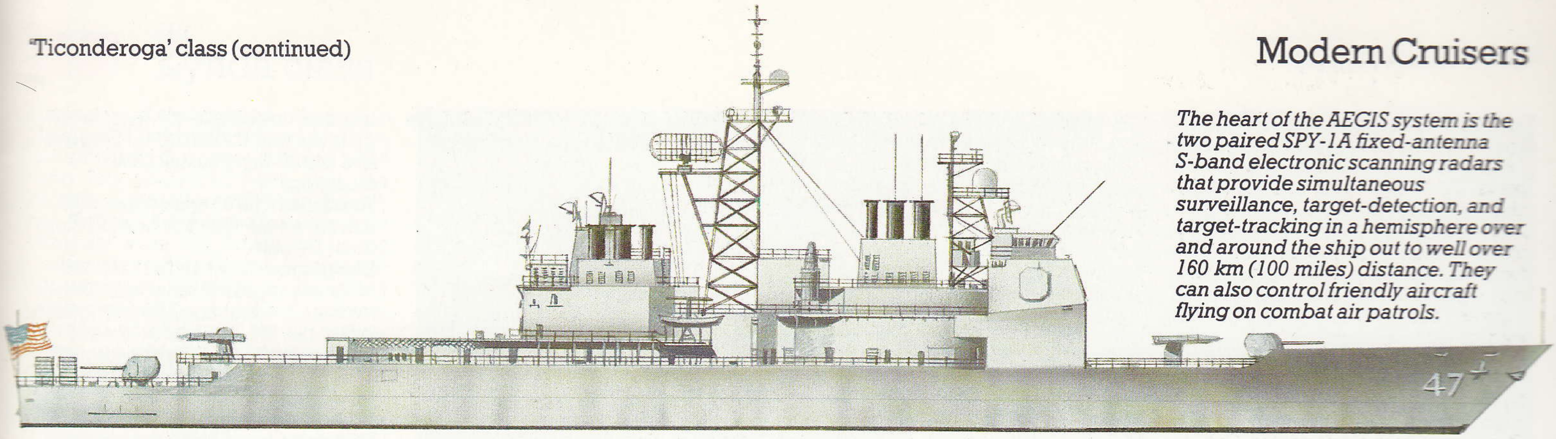
USA

'Ticonderoga' class

Evolved as a minimum-cost AEGIS SAM area-defence platform for construction in large numbers, the 'Ticonderoga' class is based on the hull of the largest existing destroyer design available, the 'Spruance' class. The original force level to be constructed was 28, but this was increased by the Reagan administration to 30, although it might be cut to 19 if the conversion of CGNs to AEGIS platforms goes ahead as only five SPY-1 radar systems can be constructed each year. The basic 'Spruance' class hull and machinery layout is used, but the larger displacement has resulted in a reduction in speed. Some criticism of the amount of topweight carried is also reported as a result of experience with the lead ship, USS ***Ticonderoga*** (CG 47), which was commissioned in 1983. The heart of the ship is its computerized AEGIS area-defence system, which has two paired SPY-1A fixed-antenna electronic scanning radars that can control friendly aircraft as well as providing simul-

The first of the AEGIS-equipped cruisers, USS Ticonderoga *(CG47), has already seen action off Lebanon during late 1983 when she engaged shore targets with her 127-mm (5-in) guns. She provides much-needed air defence for the American force against threats from both Syrian aircraft and missile systems.*





The heart of the AEGIS system is the two paired SPY-1A fixed-antenna S-band electronic scanning radars that provide simultaneous surveillance, target-detection, and target-tracking in a hemisphere over and around the ship out to well over 160 km (100 miles) distance. They can also control friendly aircraft flying on combat air patrols.

taneous surveillance, target-detection and target-tracking in a hemisphere over and around the ship. The missiles used are Standard SM2-ERs on two twin Mk 26 launcher, which can deal with saturation attacks by high-performance aircraft in combination with low-level and high-level air, surface and sub-surface launched anti-ship missiles in very heavy ECM environments. From the sixth ship onwards the two Mk 26 launchers and their magazines will be replaced by two Mk 41 vertical launchers for a total of 122 Harpoon, Standard, ASW and Tomahawk missiles instead of the 104 carried at present. The *Ticonderoga* serves in the Atlantic Fleet, and recently saw action off Lebanon during December 1983 in the shore-bombardment role.

Specification

'Ticonderoga' class
Displacement: 9,600 tons full load
Dimensions: length 172.8 m (566.8 ft); beam 16.8 m (55.0 ft); draught 9.5 m (31.0 ft)
Propulsion: four General Electric LM 2500 gas turbines delivering 80,000 shp (59655 kW) to two shafts
Speed: 30 kts
Complement: 360
Aircraft: two Kaman SH-2D Seasprite or Sikorsky SH-60B Seahawk multi-role helicopters
Armament: two octuple Harpoon SSM launchers with 16 missiles, two twin Standard SM2-ER/ASROC SAM/ASW launchers with 68 Standard and 20 ASROC missiles, two 127-mm (5-in) DP guns, two 20-mm Phalanx CIWS mountings, and two triple 324-mm (12.75-in) Mk 32 ASW torpedo tube mountings with 14 Mk 46 torpedoes
Electronics: two paired SPY-1A AEGIS radar arrays, one SPS-49 air-search radar, one SPS-10 surface-search radar, one SPQ-9A gun fire-control system, four SPG-62 Standard fire-control radars, one SLQ-32 ESM suite, four Mk 36 Super RBOC chaff launchers, one NAVSAT system, one SATCOMM system, one SQS-23 sonar, and one SQR-19 tactical towed-array sonar system

USA

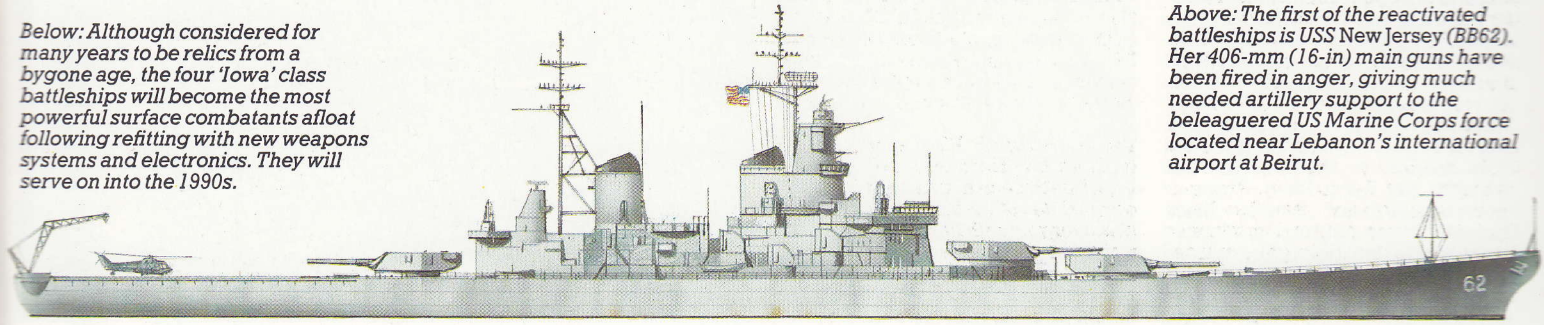
'Iowa' class

Although constructed (1940-4) during World War II as the largest examples of their type ever built apart from the Japanese *Yamato* and *Musashi*, the US battleships of the 'Iowa' class, USS ***Iowa*** (BB 61), USS ***New Jersey*** (BB 62), USS ***Missouri*** (BB 63) and USS ***Wisconsin*** (BB 64), saw considerable service after the war on various duties. In the immediate post-war period three were mothballed, whilst the *Missouri* served as a training ship. However, the Korean War (1950-3) saw all four again in active service for use as naval gunfire support vessels off the North and South Korean coastlines. They then reverted to reserve status during 1954-8 and were again mothballed. On 6 April 1967 the *New Jersey* began her second reactivation refit for active service off South Vietnam and the North Vietnamese panhandle region as a floating battery. During this deployment she spent 120 days on the 'gun line', firing 5,688 406-mm (16-in) rounds and 14,891 127-mm (5-in) rounds at targets; she then fell foul of economy cuts in 1969, when she decommissioned for her third period of mothballing.

By the 1970s the four battleships were considered as little more than relics from a bygone age, but in 1980 the need to augment the US surface combat fleet and match new Soviet warship classes resulted in the US Congress authorizing funds to reacti-

Above: The first of the reactivated battleships is USS New Jersey *(BB62). Her 406-mm (16-in) main guns have been fired in anger, giving much needed artillery support to the beleaguered US Marine Corps force located near Lebanon's international airport at Beirut.*

Below: Although considered for many years to be relics from a bygone age, the four 'Iowa' class battleships will become the most powerful surface combatants afloat following refitting with new weapons systems and electronics. They will serve on into the 1990s.



vate the battleship force. After much heated debate the initial vessel chosen, the *New Jersey*, recommissioned after modernization on 27 December 1982, beginning her first operational deployment with the Pacific Fleet in March 1983. By the end of that year she had served as part of the task forces deployed off the Nicaraguan coasts and, in December off Lebanon, had used her main armament to bombard Syrian AA positions that had fired on US Navy reconnaissance aircraft that were supporting the US Marine Corps units ashore. Eventually all four ships are to be in fleet service to operate with battle groups in the highest-threat areas with or without organic air cover and to provide US amphibious units with much-needed heavy gun fire support.

The initial modernization programme included the upgrading of the electronics, conversion of the propulsion plant to burn Navy distillate fuel, the fitting of a Combat Engagement Center, and the addition of new weapons systems at the expense of four twin 127-mm (5-in) mountings. The fantail was also reshaped to accommodate up to three Kaman SH-2D Seasprite ASW helicopters in open stowage with a fourth on the helicopter landing pad located there. A second major modernization refit is planned for the class during the ships' service lives, but its actual configuration is still under consideration. The last two units to be reactivated may be rebuilt in this configuration from scratch. The main battery of 406-mm (16-in) guns fires both 862-kg (1,900-lb) HE and 1225-kg (2,700-lb) AP shells out to 38000 m (41,560 yards) and 36750 m (40,190 yards) respectively. During the early 1950s a tactical nuclear shell, the Mk 23 'Katie' with a W23 warhead, was developed. The shell was subsequently retired from the nuclear weapons stockpile in October 1962, and it is believed that none were actually taken to sea although the ships' magazines were due to carry 10 of these shells within the 406-mm (16-in) inventory.

Specification
'Iowa' class
Displacement: 45,000 tons standard and 57,450 tons full load (BB 61 and 63), or 59,000 tons full load (BB 62) or 57,216 tons full load (BB 64)
Dimensions: length 270.4 m (887.2 ft) except BB 62 270.5 m (887.6 ft); beam 33.0 m (108.2 ft); draught 11.6 m (38 ft)
Propulsion: geared steam turbines delivering 212,000 shp (158090 kW) to four shafts
Speed: 32.5 kts, except BB 63 27.5 kts as a result of a grounding accident
Complement: BB 61 and 62 1,571, and BB 63 and 64 2,365
Aircraft: two or four Kaman SH-2D Seasprite multi-role helicopters on the fantail landing pad (BB 61 and 62 only)
Armament: (BB 61 and 62) eight quadruple Tomahawk SSM launchers with 32 missiles, four quadruple Harpoon SSM launchers with 16 missiles, three triple 406-mm (16-in) guns, six twin 127-mm (5-in) DP guns, and four 20-mm Phalanx CIWS mountings
Armament: (BB 63 and 64) nine 406-mm (16-in) guns, and 10 twin 127-mm (5-in) DP guns
Electronics: (BB 61 and 62) one SPS-10F surface-search radar, one SPS-49 air-search radar, one LN66 navigation radar, two Mk 38 guns fire-control systems, four Mk 37 gun fire-control systems, one Mk 40 gun director, one Mk 51 gun director, one SLQ-32 ESM suite, eight Mk 36 Super RBOC chaff launchers, one NAVSAT system, and one SATCOMM system
Electronics: (BB 63 and 64) one SPS-10 surface-search radar, one SPS-6C air-search radar, one SPS-8A height-finder radar, four Mk 37 gun fire-control systems, two Mk 38 gun fire-control systems, one Mk 40 gun director, four Mk 51 gun directors, six Mk 56 and two Mk 53 gun fire-control system (BB 63 only)

USSR

'Sverdlov' class

Destined originally to be a 24-ship programme in Stalin's post-war Soviet navy plan, the 'Sverdlov' class finally consisted of 20 hulls laid down, of which only 17 were launched; three of these latter were never completed and were laid up in the Neva river at Leningrad for a number of years before being scrapped. The remaining 14 were completed during the period 1951-5 in two slightly different forms, but all were essentially an improved version of the pre-war designed but post-war completed 'Chapayev' cruiser class. One, the ***Ordzhonikidze***, was transferred to Indonesia in 1962 as the *Irian* (and scrapped in 1972 in Taiwan following a chronic spares problem), whilst in the late 1950s the ***Dzerzhinsky*** was converted into an experimental SAM cruiser with a navalized version of the Soviet army's SA-2 'Guideline' fitted in place of the X 152-mm (6-in) gun turret. This proved to be unsuccessful in service and the vessel had by the late 1970s been placed in reserve with the Black Sea Fleet. The ***Admiral Nakhimov*** was also converted around the same time to a trials ship for the SS-N-1 'Scrubber' anti-ship missile system, but was subsequently scrapped in 1961 without ever having left Soviet waters. Of the remaining ships two (the ***Admiral Senyavin*** and ***Zhdanov***) were converted to the KU (*Korabl' Upravleuiye*, or command ship) role in 1971-2; the former serves as the Pacific Fleet flagship for special deployments and the latter with the Black Sea Fleet for the same purposes. The other nine ***Admiral Lazarev, Admiral Ushakov, Aleksander Nevsky, Aleksandr Suvorov, Dmitri Pozharsky, Mikhail Kutzov, Murmansk, Oktyabskaya Revolutsiya*** and ***Zhdanov***) are conventional cruisers (Soviet designation KR, *Kreyser*). Three are with the Pacific Fleet (one in reserve status), two with the Black Sea Fleet, two with the Northern Fleet and two with the Baltic Fleet. Three of these, the *Admiral Ushakov* (Black Sea), the *Aleksandr Suvorov* (Pacific) and the *Oktyabrskaya Revolutsiya* (Baltic) underwent refits in 1977-9 that included the extension of the bridge superstructure aft, the fitting of eight twin 30-mm AA guns with four 'Drum Tilt' fire-control radars, and the removal of the 'Egg Cup' 100-mm (3.9-in) fire-control radars from the main turrets. The primary use for these vessels now lies with their main and secondary armaments for the support of Soviet and Warsaw Pact army units and Naval Infantry in amphibious assaults and ground attacks on NATO and other Western targets. This capability is unmatched in all NATO navies other than the American, which has the reactivated 'Iowa' class battleships with an even heavier armament.

Specification
'Sverdlov' class
Displacement: 12,900 tons standard and 17,000 tons full load
Dimensions: length 210.0 m (689.0 ft); beam 22.0 m (72.2 ft); draught 7.2 m (23.6 ft)
Propulsion: geared steam turbines delivering 110,000 shp (82025 kW) to two shafts
Speed: 32.5 kts
Complement: 1,000
Aircraft: one Kamov Ka-25 'Hormone-C' utility helicopter (in *Admiral Senyavin* only)
Armament: one twin SA-N-2 'Guideline' SAM launcher with eight missiles (in *Dzerzhinsky* only) or one twin SA-N-4 'Gecko' SAM launcher with 18 missiles (in *Admiral Senyavin* and *Zhdanov* only), four triple 152-mm (6-in) DP guns (three triple mountings in *Dzerzhinsky* and *Zhadanov*, and two triple mountings in *Admiral Senyavin*), six twin 100-mm (3.9-in) DP guns, 16 twin 37-mm AA guns (14 twin mounting in 1977-9 modifications, and eight twin mountings in the *Dzerzhinsky, Admiral Senyavin* and *Zhdanov*), four twin 30-mm AA (in *Zhdanov* only, while the *Admiral Senyavin* and 1977-9 modifications have eight twin mountings), and up to 200 mines (none in *Admiral Senyavin* and *Zhdanov*)
Electronics: (*Dzerzhinsky*) one 'Big Net' air-search radar, one 'Low Sieve' air-search radar, one 'Slim Net' air-search radar, one 'Fan Song-E' SA-N-2 fire-control radar, two 'Sun Visor' 152-mm (6-in) fire-control radars, one 'Top Bow' gun fire-control radar, and one 'Neptune' navigation radar
Electronics: (*Admiral Senyavin* and *Zhdanov*) one 'Top Trough' air-search radar, one 'Pop Group' SA-N-4 fire-control radar, one 'Sun Visor' 152-mm (6-in) fire-control radar, two 'Top Bow' 152-mm (6-in) fire-control radars, four 'Drum Tilt' 30-mm fire-control radars (only two in *Zhdanov*), and six 'Egg Cup' gun fire-control radars
Electronics: (others) one 'Big Net' or 'Top Trough' air-search radar, one 'High Sieve' or 'Low Sieve' air search radar, one 'Knife Rest' air-search radar (in some ships only), one 'Slim Net' air-search radar, one 'Don-2' or 'Neptune' navigation radar, two 'Sun Visor' gun fire-control radars, two 'Top Bow' 152-mm (6-in) fire-control radars, eight 'Egg Cup' gun fire-control radars, and one 'Watch Dog' ECM system

The experimental SAM missile cruiser* Dzerzhinsky*, fitted with a navalized version of the Soviet army's SA-2 'Guideline' missile, which proved unsuccessful in service. The vessel was placed in the reserve category with the Black Sea Fleet in the late 1970s.

USSR

'Kynda' class

Launched at the Zhdanov Shipyard in Leningrad between 1961 and 1964, in a programme that was curtailed after only four ships had been built, the 'Kynda' class cruisers ***Grozny, Admiral Fokin, Admiral Golovko*** and ***Varyag*** were the first ships in the Soviet navy to introduce a pyramid superstructure supporting the type's numerous radar and ESM systems. Classed as RKR units by the Soviets, these are dedicated anti-surface ship warfare vessels tasked with countering the American carriers. For this role the main armament comprises two trainable four-round launcher banks of SS-N-3B 'Shaddock' cruise missiles, one reload for each tube located within magazines in the superstructure immediately behind each launcher unit. The reloading operation is a slow and difficult process, however, requiring a relatively calm sea. The ships have no organic air component other than a simple helicopter landing pad aft, and thus have to rely on third-party targeting sources such as naval air force Tupolev Tu-95 'Bear-D' aircraft for over-the-horizon missile engagements.

Propulsion is provided by a set of pressure-fired geared steam turbines that exhaust through large twin funnels. The air-defence armament is limited to a single SA-N-1 'Goa' twin launcher forward and two twin 76-mm (3-in) DP gun turrets aft, whilst the ASW armament is limited to a pair of RBU 6000 ASW rocket-launchers and two triple ASW torpedo tube banks. The RBU 6000 fires a 75-kg (165-lb) HE projectile with optional depth or magnetic proximity fusing. The 12 barrels are fired in a paired sequence after the launcher has been trained in azimuth and elevation by a dedicated fire-control console. The launcher is reloaded automatically when it is trained to the vertical, the magazine being directly beneath the launcher. The 533-mm (21-in) torpedoes are acoustic-homing types optimized for the ASW role. Two of the 'Kynda' class cruisers currently operate with the Black Sea Fleet for deployments to the Mediterranean, whilst the other two are in the Pacific Fleet. Most of the 'Kynda' class ships have undergone modernization refits.

Specification

'Kynda' class

Displacement: 4,400 tons standard and 5,600 tons full load

Dimensions: length 141.7 m (464.9 ft); beam 16.0 m (52.5 ft); draught 5.3 m (17.4 ft)

Propulsion: geared steam turbines delivering 100,000 shp (74570 kW) to two shafts

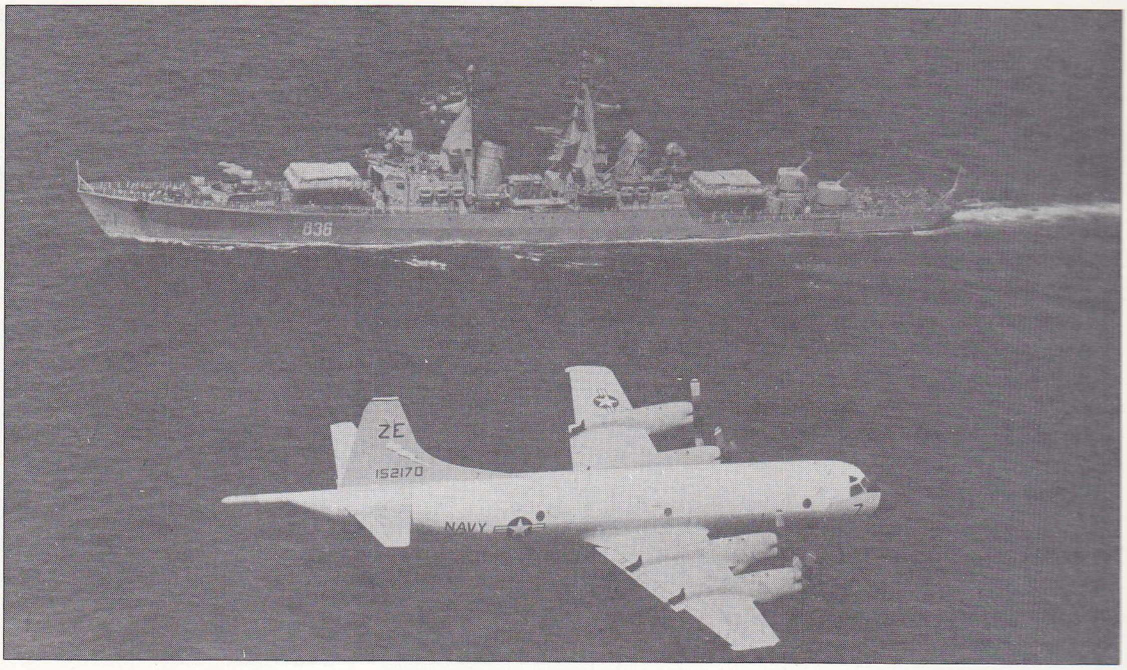
Speed: 35 kts

Complement: 375

Aircraft: none embarked, though a helicopter platform is provided

Armament: two quadruple SS-N-3B 'Shaddock' SSM launchers with 16 missiles, one twin SA-N-1 'Goa' SAM launcher with 16 missiles, two twin 76-mm (3-in) DP guns, four 30-mm ADG6-30 CIWS mountings (in *Varyag* only), two 12-barrel RBU 6000 ASW rocket-launchers, and two triple 533-mm (21-in) ASW torpedo tube mountings

Electronics: two 'Head Net-A' air-search radars (in *Grozny* and *Admiral Golovko*), or one 'Head Net-A' and one 'Head Net-C' air-search radars (in *Admiral Fokin* only) or two 'Head Net-C' air-search radars (in *Varyag* only), two 'Plinth Net' surface-search radars (none in *Admiral Golovko*), two 'Don-2' navigation radars, one 'Owl Screech' 76-mm (3-in) fire-control radar, one 'Peel Group' SAM fire-control radar, two 'Scoop Pair' SSM fire-control radars, two 'Bass Tilt' CIWS fire-control radars (in *Varyag* only), 'Bell Clout', 'Bell Slam' and 'Bell Tap' ECM systems, one 'Top Hat' ECM system, and one high-frequency hull sonar



One of the Soviet Pacific Fleet's two 'Kynda' class rocket cruisers (RKR), with a Lockheed P-3B Orion maritime patrol aircraft in attendance. The 'Kyndas' have to rely on third-party over-the-horizon targeting data to effectively use their main armament.

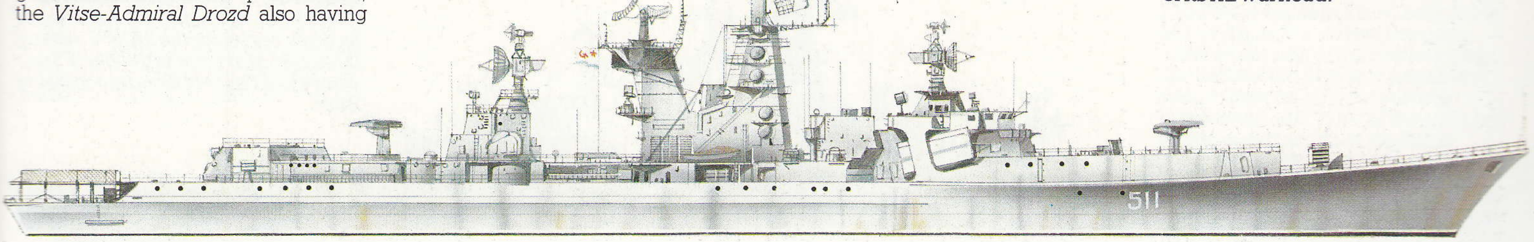
USSR

'Kresta I' and 'Kresta II' classes

Built at the Zhdanov Shipyard in Leningrad, the first 'Kresta I' class BPK (later changed by the Soviets to RKR) was completed in 1967. Only four ships were built (***Admiral Zozulya, Vladivostok, Vitse-Admiral Drozd*** and ***Sevastopol***, commissioned 1967-9), and it is likely that they were an interim design between the anti-ship 'Kynda' and the ASW 'Kresta II' classes. The 'Kresta I' class ships are larger than the former class with a different hull form, half the SS-N-3B 'Shaddock' SSM battery (but with no reloads) and increased anti-air warfare capabilities. The ships were also the first Soviet surface combatants to have a helicopter hangar, for a single Kamov Ka-25 'Hormone-B' missile-targeting helicopter. Two of the ships have since undergone additions to their superstructure, the *Vitse-Admiral Drozd* also having two 'Bass Tilt' fire-control radars and four 30-mm CIWS fitted. The SA-N-1 'Goa' SAM systems carried in this class have a secondary anti-ship capability, with an alternate 10-kiloton yield nuclear warhead in place of the usual 60-kg (132-lb) HE type.

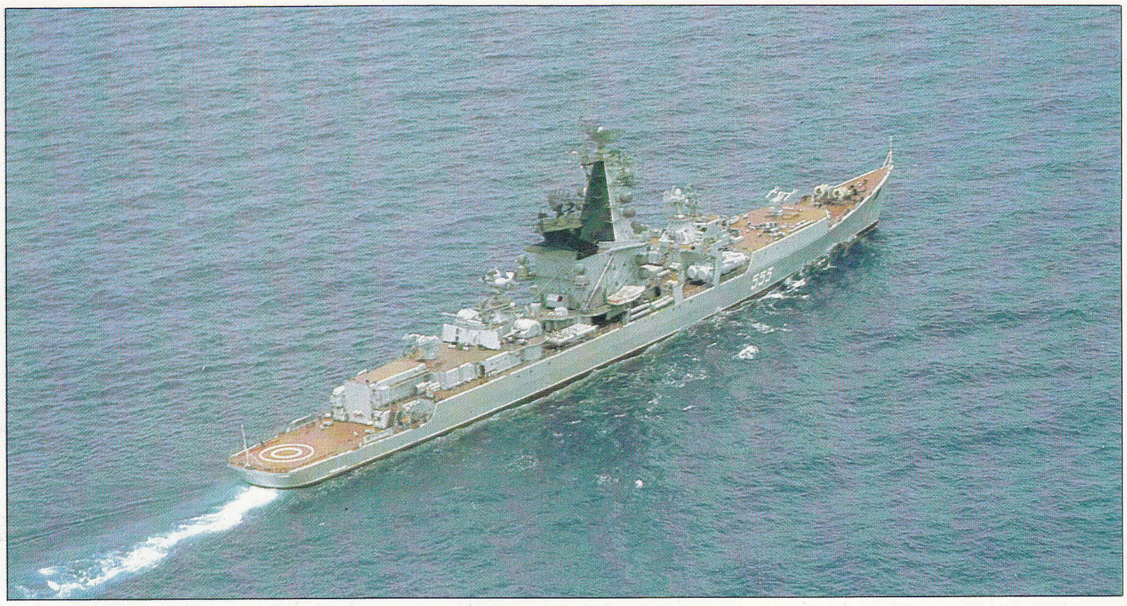
Following the last 'Kresta I' on the slipway came the first of 10 'Kresta II' BPK hulls (the ***Kronshtadt, Admiral Isakov, Admiral Nakhimov, Admiral Makarov, Marshal Voroshilov, Admiral Oktyabrisky, Admiral Isachenkov, Vasily Chapayev*** and ***Admiral Yumashev***), all commissioned between 1970 and 1978. These are similar in design but have significantly different SAM, ASW and electronic outfits. The 'Shaddock' launchers were replaced by two quadruple SS-N-14 'Silex' ASW missile-launcher boxes (although the first missiles were not actually carried for several years, hence the incorrect NATO designation of the SS-N-10 anti-ship missile assigned to these launchers), whilst the SA-N-1 SAM system was replaced by the SA-N-3 'Goblet' system. For operation in heavy weather fin stabilizers were fitted. The same hangar arrangement was adopted, but with a Kamov Ka-25 'Hormone-A' ASW

A Soviet 'Kresta II' class BPK, armed with SS-N-14 'Silex' ASW missiles in two quadruple launcher boxes either side of the bridge. The class also has a useful anti-ship capability in its 'Silexes' and SA-N-3 'Goblet' SAM missiles. The latter can be fitted with a 25 kt nuclear warhead in place of its HE warhead.



helicopter. At present the Soviet Northern Fleet has one 'Kresta I' and five 'Kresta II' cruisers, the Baltic Fleet one 'Kresta I' and two 'Kresta II' cruisers, and the Pacific Fleet two 'Kresta I' and three 'Kresta II' cruisers.

Specification
'Kresta I' class
Displacement: 6,000 standard and 7,600 tons full load
Dimensions: length 155.5 m (510.2 ft); beam 17.0 m (55.75 m) draught 6.0 m (19.7 ft)
Propulsion: geared steam turbines delivering 100,000 shp (74570 kW) to two shafts
Speed: 34 kts
Complement: 380
Aircraft: one Kamov Ka-25 'Hormone-B' missile-guidance helicopter
Armament: two twin SS-N-3B 'Shaddock' SSM launchers with four missiles, two SA-N-1 'Goa' SAM launchers with 32 missiles, two twin 57-mm DP guns, four 30-mm ADG6-30 CIWS mountings (in *Vitse-Admiral Drozd* only), two 12-barrel RBU 6000 ASW rocket-launcher, two six-barrel RBU 1000 ASW rocket-launchers, and two quintuple 533-mm (21-in) ASW torpedo tube mountings
Electronics: one 'Big Net' air-search radar, one 'Head Net' 3D radar, two 'Peel Group' SAM fire-control radars, two 'Muff Cob' 57-mm fire-control radars, two 'Bass Tilt' CIWS fire-control radars (in *Vitse-Admiral Drozd* only), two 'Plinth Net' surface-search radar, two 'Don-2' navigation radars, one 'Scoop Pair' SSM-guidance radar, one 'Side Globe' ESM suite, 'Bell Clout', 'Bell Tap' and 'Bell Slam' ECM systems, and one high-frequency hull sonar



Almost certainly an interim class between the 'Kynda' and 'Kresta II' designs, the anti-ship RKR 'Kresta I' class carries two twin launchers for the SS-N-3B 'Shaddock' SSM either side of the bridge. To target the missiles they carry their own Kamov Ka-25 'Hormone-B' helicopter in a stern-mounted hangar.

Specification
'Kresta II' class
Displacement: 6,000 standard and 7,600 tons full load
Dimensions: length 158.5 m (520.0 ft); beam 17.0 m (55.75 m) draught 6.0 m (19.7 ft)
Propulsion: geared steam turbines delivering 100,000 shp (74570 kW) to two shafts
Speed: 34 kts
Complement: 400
Aircraft: one Kamov Ka-25 'Hormone-A' ASW helicopter
Armament: two quadruple SS-N-14 'Silex' ASW launchers with eight missiles, two twin SA-N-3 'Goblet' SAM launchers with 48 missiles, two twin 57-mm DP guns, four 30-mm ADG6-30 CIWS mounting, two 12-barrel RBU 6000 ASW rocket-launchers, two six-barrel RBU 1000 ASW rocket-launchers, and two quintuple 533-mm (21-in) ASW torpedo tube mountings
Electronics: one 'Head Net-C' 3D radar, one 'Top Sail' 3D radar, two 'Head Light' SAM fire-control radars, two 'Muff Cob' 57-mm fire-control radars, two 'Bass Tilt' CIWS fire-control radars, two 'Don Kay' navigation radars, two 'Don-2' navigation radars, one 'Side Globe' ESM suite, 'Bell Clout', 'Bell Tap' and 'Bell Slam' ECM systems, and one medium-frequency bow sonar

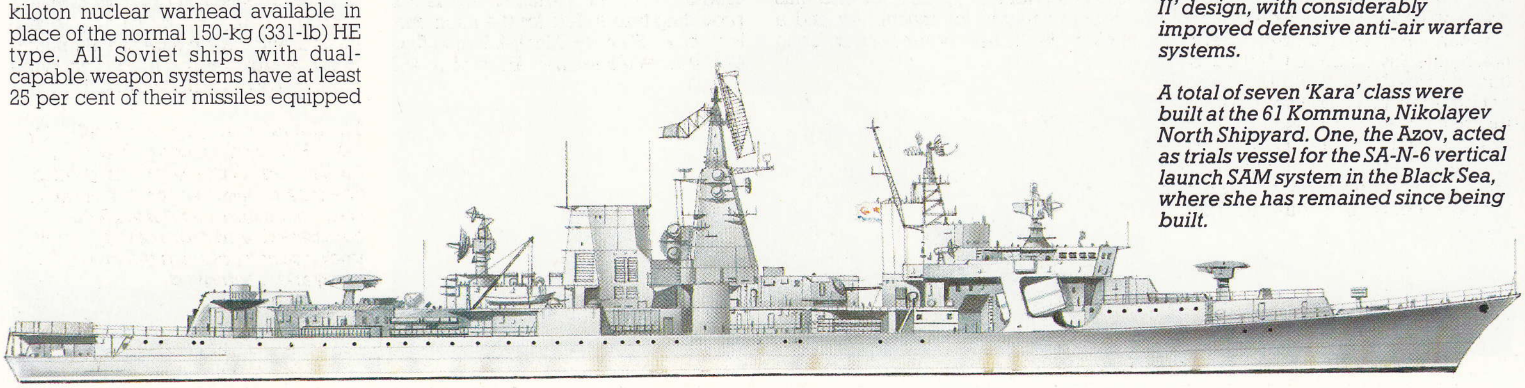
USSR

'Kara' and 'Krasina' classes

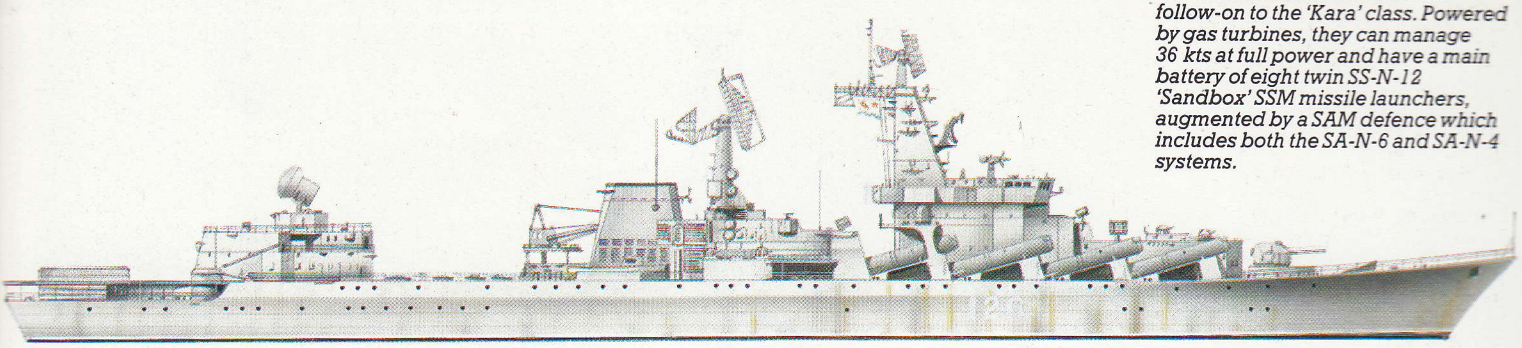
Built at the 61 Kommuna, Nikolayev North Shipyard between 1971 and 1977, the seven units of the 'Kara' class (***Nikolayev, Ochakov, Kerch, Azov, Petropavlovsk, Tashkent*** and ***Tallinn***) are rated by the Soviets as BPKs (*Bolshoy Protivolodochnyy Korabl'*, or large anti-submarine ship). They are an enlarged COGAG gas turbine-powered refinement of the steam-powered 'Kresta II' design with improved anti-air warfare and ASW warfare systems, commissioned between 1973 and 1980 for service in the Mediterranean and Pacific Fleet theatres of operations. They also have extensive command and control facilities and can act as hunter-killer task group leaders. The SA-N-3 'Goblet' and SS-N-14 'Silex' ASW missiles carried have secondary anti-ship capabilities, the former missile having a 25-kiloton nuclear warhead available in place of the normal 150-kg (331-lb) HE type. All Soviet ships with dual-capable weapon systems have at least 25 per cent of their missiles equipped with nuclear warheads whilst at sea. The 'Kara' class design's large superstructure is dominated by a single low gas turbine exhaust funnel. On the ship's stern is a helicopter landing pad with a hangar partially recessed below the flight deck, and to stow the Kamov Ka-25 'Hormone-A' ASW helicopter the hanger roof hatch and doors have to be opened before the helicopter is pushed in and then lowered to the deck via an elevator. The fourth ship completed, the ***Azov***, was the trials ship for the new generation SA-N-6 vertical SAM and 'Top Dome' fire-control radar in the Black Sea after her aft SA-N-3 'Goblet' and 'Headlight' fire-control radar combination had been replaced by the new systems.

At present four 'Kara' class ships are with the Black Sea Fleet (including the

Fitted to act as ASW hunter-killer task group leaders, the 'Kara' class are essentially COGAG gas-turbine-powered refinements of the 'Kresta II' design, with considerably improved defensive anti-air warfare systems.



A total of seven 'Kara' class were built at the 61 Kommuna, Nikolayev North Shipyard. One, the Azov, acted as trials vessel for the SA-N-6 vertical launch SAM system in the Black Sea, where she has remained since being built.



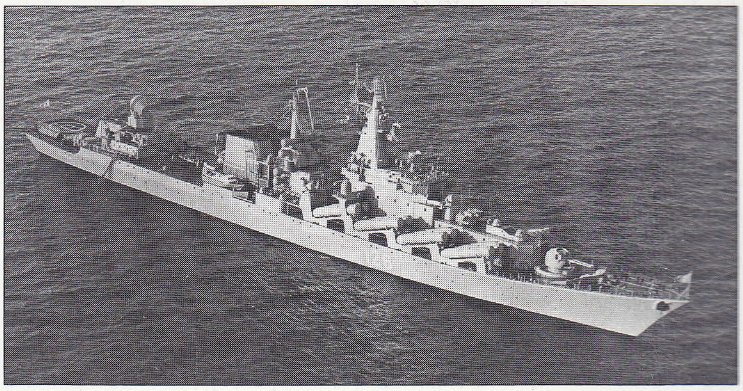
The 'Krasina' class of RKR is the follow-on to the 'Kara' class. Powered by gas turbines, they can manage 36 kts at full power and have a main battery of eight twin SS-N-12 'Sandbox' SSM missile launchers, augmented by a SAM defence which includes both the SA-N-6 and SA-N-4 systems.

Azov which stays there), and the remaining three are in the Pacific Fleet. The Black Sea vessels (except *Azov*) regularly deploy to the Mediterranean squadron.

In 1983 the first of the 'Kara' follow-on class, the 'Krasina' class RKR missile cruiser, was seen outside the Black Sea. The lead ship, the ***Slava***, was laid down at the same Nikolayev Shipyard in 1976 after the last 'Kara' hull, and launched in 1979 with completion in 1983 after extensive trials. The hull appears to be an improved 'Kara' type with increased beam and length to accommodate new weapon systems, enhance stability and allow the radar mast height to be increased. Twin funnel exhausts are fitted, indicating gas turbine propulsion. The primary role is anti-ship warfare for which two rows of four paired SS-N-12 'Sandbox' SSMs are carried on each side of the forward superstructure. Aft of the funnels are eight eight-round vertical-launch SA-N-6 bin launchers and a 'Top Dome' fire-control radar. All other available details are given in the specification. By the late 1980s at least six 'Krasina' class cruisers are expected to be in service, with a final class total of eight in the 1990s.

Specification

'Kara' class
Displacement: 8,200 tons standard and 9,700 tons full load
Dimensions: length 173.0 m (567.6 ft); beam 18.6 m (61.0 ft); draught 6.7 m (22.0 ft)
Propulsion: COGAG gas turbine arrangement delivering 120,000 shp (89485 kW) to two shafts
Speed: 34 kts
Complement: 525
Aircraft: one Kamov Ka-25 'Hormone-A' anti-submarine helicopter
Armament: two twin SA-N-3 'Goblet' SAM launchers with 72 missiles (except in *Azov* which has only one SA-N-3 system plus one SA-N-6 SAM system), two twin SA-N-4 'Gecko' SAM launchers with 36 missiles, two quadruple SS-N-14 'Silex' ASW launchers with eight missiles, two twin 76-mm (3-in) DP guns, four 30-mm ADG6-30 CIWS mountings, two 12-barrel RBU 6000 ASW rocket-launchers, two (none in *Petropavlovsk*) RBU 1000 ASW rocket-launchers, and two quintuple 533-mm (21-in) ASW torpedo tube mountings
Electronics: one 'Top Sail' 3D radar, one 'Head Net-C' 3D radar, two 'Pop Group' SA-N-4 fire-control radars, two 'Head Light' SA-N-3 fire-control radars (except in *Azov*, which has one 'Head Light' plus one 'Top Dome' SA-N-6 fire-control radar), two 'Owl Screech' 76-mm (3-in) fire-control radars, two 'Bass Tilt' CIWS fire-control radars, two 'Don Kay' navigation radars, one 'Don-2' or 'Palm Frond' navigation radar, one 'Side Globe' ESM suite, 'Bell' series ECM systems (in *Nikolayev* and *Ochakov* only) or 'Rum Tub' ECM systems (except in *Nikolayev* and *Ochakov*), two 'Round House; TACAN (in *Petropavlovsk* only), one low-frequency bow sonar, and one medium-frequency variable-depth sonar



The first 'Krasina' class cruiser, the* Slava*, pictured at anchor off Solum, Libya during her first out-of-area deployment in late 1983. She later sailed to join the Soviet Northern Fleet, passing the United Kingdom on the way. Only the USA has ships that can match her.

Specification (provisional)

'Krasina' class
Displacement: 11,550 tons standard and 13,000 tons full load
Dimensions: length 187.0 m (613.5 ft); beam 22.3 m (73.2 ft); draught 7.6 m (24.9 ft)
Propulsion: gas turbines
Speed: 36 kts
Complement: 650
Aircraft: two Kamov Ka-27 helicopters (one 'Helix-A' anti-submarine helicopter and one 'Helix-B' missile-guidance helicopter)
Armament: eight twin SS-N-12 'Sandbox' SSM launchers with 16 missiles, eight SA-N-6 SAM launchers with 64 missiles, two twin SA-N-4 'Gecko' SAM launchers with 36 missiles, one twin 130-mm (5.12-in) DP gun, six 30-mm ADG6-30 CIWS mountings, two 12-barrel RBU 6000 ASW rocket-launchers, and two quadruple 533-mm (21-in) ASW torpedo tube mountings
Electronics: one 'Top Pair' 3D radar, one 'Trap Door' SS-N-12 guidance radar, one 'Kite Screech' 130-mm (5.12-in) fire-control radar, one 'Top Dome' SA-N-6 fire-control radar, two 'Pop Group' SA-N-4 fire-control radars, three 'Bass Tilt' CIWS fire-control radars, one 'Side Globe' ESM suite, one 'Rum Tub' ECM suite, and one low-frequency bow sonar

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USSR

'Kirov' class

In December 1977 at the Baltic Shipyard in Leningrad the Soviet Union launched the largest warship built by any nation since World War II except for aircraft-carriers. Commissioned into Soviet fleet service in 1980, the ***Kirov*** was assigned the RKR (*Raketnyy Kreyser*, or missile cruiser) designation by the Soviets and a CGN designation by the Americans. However, in appearance and firepower the *Kirov* is more akin to the obsolete battle-cruiser category. Her powerplant is unique in being a combined nuclear and steam propulsion system with two reactors coupled to oil-fired boilers that superheat the steam produced in the reactor plant to increase the power output available during high-speed running. The massive superstructure has most of the weapons systems located forward of it, the after end thus being available for machinery and a below-decks helicopter hangar. Up to five Kamov Ka-25 'Hormone' or Ka-27 'Helix' helicopters can be accommodated in the hangar, with access to the flight deck by a deck lift. The helicopters are a mix of the ASW and missile-guidance/ELINT variants, the latter providing target data for the main battery of 20 SS-N-19 Mach-2.5 anti-ship cruise missiles located forward in 45° recessed launch tubes.

The area-defence SAM is the vertical launch SA-N-6 system, which has 12 below-decks eight-round rotary launchers forward of the SS-N-19 bins. The SA-N-6 is some 7 m (23 ft) long with a 10/100-km (6.2/62-mile) range envelope, and can engage sea-skimming cruise missiles if required. The maxi-

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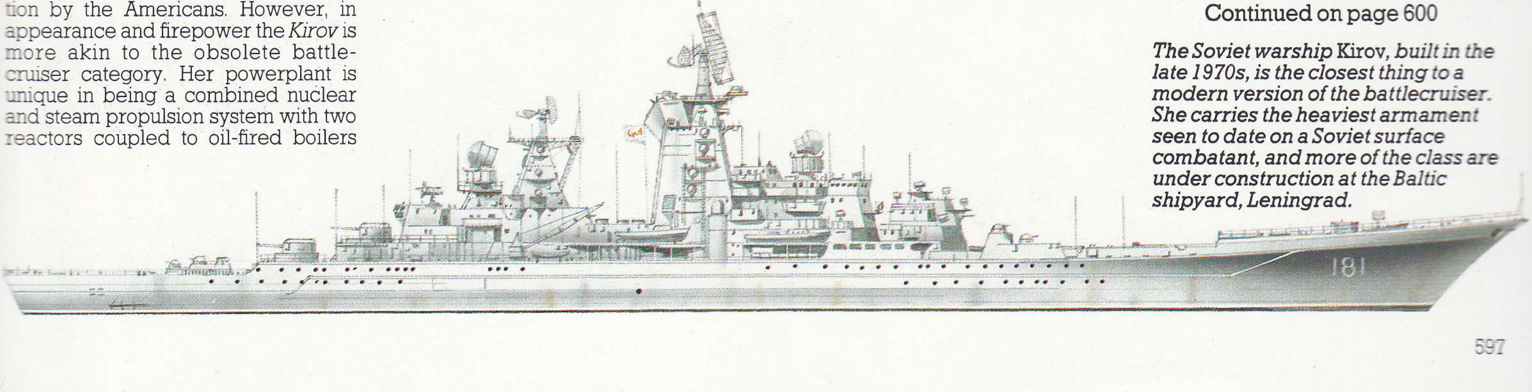


The Soviet warship* Kirov*, built in the late 1970s, is the closest thing to a modern version of the battlecruiser. She carries the heaviest armament seen to date on a Soviet surface combatant, and more of the class are under construction at the Baltic shipyard, Leningrad.

Return of the Battleship

While the 1980s have seen both the Soviet and US navies introduce the concept of the Surface Action Group, based around major surface vessels, the approach of the two powers has been very different in terms of vessels and functions.

The 'Iowa' class has retained its massive 406-mm (16-in) guns in spite of the more modern weaponry now fitted. The US Navy has lacked adequate bombardment capacity in recent years, and the re-introduction of the big gun provides enormous power to amphibious operations.

Of the 32 gunned capital ships sunk during World War II, only eight were sunk by their own kind. Between them, the aircraft and the submarine seemed to have put the battleship into terminal decline, to work out its remaining years as close escort to the new queen of the board, the aircraft-carrier, or to occupy itself in shore bombardment support.

Today, nearly 40 years on, there is new interest in the 'battleship' concept as a result of two widely separated and unconnected events, the upgrading and recommissioning of the four American 'Iowa' class battleships and the entry into service of the Soviet *Kirov*.

Controversy rages around the first. To many, the 'Iowa' class ships represent a sort of 'Dad's Navy', whose resuscitation is a triumph of nostalgia over common sense. To others, their potential is so radical in the context of the current maritime scenes that their effect on an operation would be equivalent to, say, Hannibal's pitting of elephant against horse. As with many hot issues, each point of view has both merits and drawbacks.

It should be understood that the Americans, at this juncture, would not have 're-invested' in the battleship; the ships happened to be available, they were in excellent preserved condition and they had been comparatively little used. After a long period of decline, the US Navy is being built up by the Reagan administration to a target of 600 ships by 1990. As each of the 'Iowa' class ships can be reactivated with modest improvements for the same order of cost as the acquisition of one new frigate, their sheer flexibility must make them good value, even taking a probable 1,600 crew for each into account.

Each 'Iowa' class ship displaces 58,000 tons at full load, with a 270-m (885-ft) hull driven at 35 kts by 250,000 shp (186425 kW). In an age of paper-thin ships, she has an armoured belt over 300 mm (11.8 in) thick, while the faces of each triple 406-mm (16-in) gun turret are 432 mm (17 in) thick. Unlike virtually anything else at sea today, an 'Iowa' class ship can absorb punishment and survive.

While nine 406-mm (16-in) guns are an undoubted asset, it was the great hulls' capacity for carrying modern weaponry that won the class a new lease of life. Although two modernization phases are proposed, it would seem unlikely, except in a national emergency, that even the first phase will be seen through to all four units.

Phase I will see the main battery retained and the 20-gun secondary armament reduced to 12. Eight quadruple armoured launchers will be added for 32 Tomahawk cruise missiles, as will four quadruple launchers for Harpoon SSMs and four Vulcan/Phalanx CIWS mountings. Tomahawks will be carried in the 450-km (280-mile) anti-surface ship versions and both nuclear- and conventionally-armed 2500-km (1550-mile) terrain-following land-attack variants. Harpoon can be guided, with organic helicopter correction, out to about 110 km (68 miles). With conventional munitions, the 406-mm (16-in) battery can achieve more than 40 km (25 miles), but this could be significantly improved with a range of rocket-assisted rounds which, if laser-guided, could virtually ensure a one-shot/one-hit capability.

Even without her missiles, an 'Iowa' class ship should find any of today's surface warships easy meat once within gun range. Her speed of 35 kts can outpace the greater majority of current ships, and she carries over 1,200 406-mm (16-in) rounds compared with an average of eight SSMs by a potential adversary. Hit by an SSM, she will absorb the detonation as it is not armour-piercing, while the first 406-mm (16-in) salvo taken by an opponent will prove critical to flimsy construction and delicate electronics.

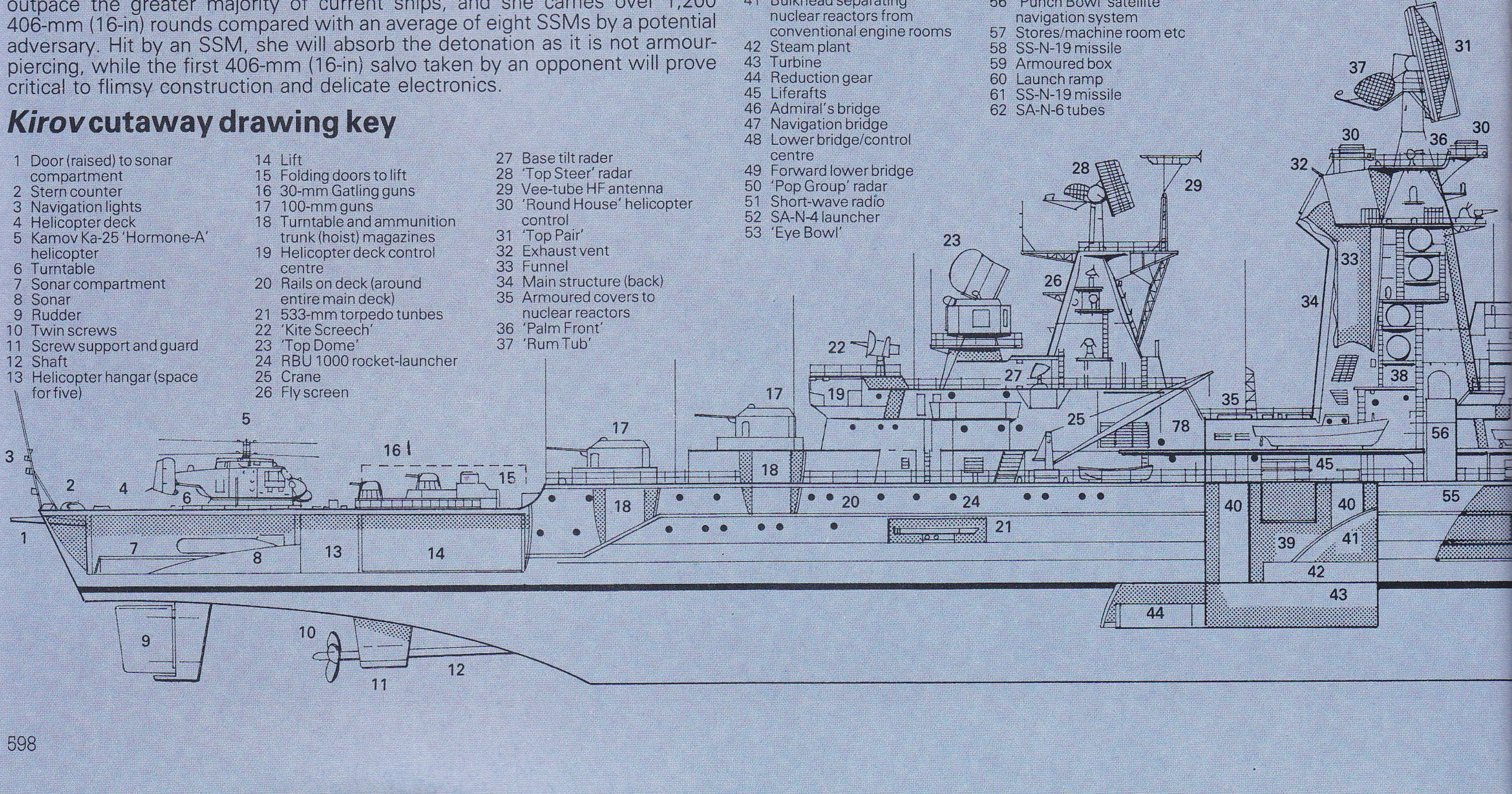
The imponderable would be that an 'Iowa' class ship, as the nucleus of a surface action group (SAG), would be engaged solely by Soviet nuclear submarines or aircraft or, if action were unavoidable, a surface ship firing the nuclear-tipped SSMs which, reportedly, comprise a quarter of each Soviet ship's magazine capacity. Although leading such a group, she will be as dependent upon them for ASW and AAW support as battleships of the previous generation. This is a potential flaw and should be thoroughly explored by realistic exercise on the first ship, *New Jersey*, before funds are committed for the remainder.

Other proposed battleship roles include lending a new degree of versatility to an attack carrier group, bombardment support for amphibious landings and as a peacetime flagship with a high level of 'presence'.

Proposed Phase II modifications would be more fundamental, including the building of a flight deck over the after end as far forward as the after funnel and as high as the bridge deck. Below would be stowage for both V/STOL aircraft and LAMPS III helicopters. The flight deck would bifurcate at 11° to the ship's axis, terminating on either side of the after funnel in 'ski-jumps'. The redundant No. 3 turret would be replaced by a 40-cell vertical launch system (VLS) whose top would be flush with the flight deck.

Kirov cutaway drawing key

1 Door (raised) to sonar compartment
2 Stern counter
3 Navigation lights
4 Helicopter deck
5 Kamov Ka-25 'Hormone-A' helicopter
6 Turntable
7 Sonar compartment
8 Sonar
9 Rudder
10 Twin screws
11 Screw support and guard
12 Shaft
13 Helicopter hangar (space for five)
14 Lift
15 Folding doors to lift
16 30-mm Gatling guns
17 100-mm guns
18 Turntable and ammunition trunk (hoist) magazines
19 Helicopter deck control centre
20 Rails on deck (around entire main deck)
21 533-mm torpedo tunbes
22 'Kite Screech'
23 'Top Dome'
24 RBU 1000 rocket-launcher
25 Crane
26 Fly screen
27 Base tilt rader
28 'Top Steer' radar
29 Vee-tube HF antenna
30 'Round House' helicopter control
31 'Top Pair'
32 Exhaust vent
33 Funnel
34 Main structure (back)
35 Armoured covers to nuclear reactors
36 'Palm Front'
37 'Rum Tub'
38 'Side Globe' early warning
39 Engine room
40 Nuclear reactor
41 Bulkhead separating nuclear reactors from conventional engine rooms
42 Steam plant
43 Turbine
44 Reduction gear
45 Liferafts
46 Admiral's bridge
47 Navigation bridge
48 Lower bridge/control centre
49 Forward lower bridge
50 'Pop Group' radar
51 Short-wave radio
52 SA-N-4 launcher
53 'Eye Bowl'
54 Forward fire-control and direction-finding centre
55 Crew/stores
56 'Punch Bowl' satellite navigation system
57 Stores/machine room etc
58 SS-N-19 missile
59 Armoured box
60 Launch ramp
61 SS-N-19 missile
62 SA-N-6 tubes



USS **New Jersey** *(BB-62) at the head of her Central American task group. Soon she was to be steaming across the Atlantic to make her presence felt off the troubled coast of Lebanon, where her guns were fired in anger for the first time since 1968.*

With a capacity of 320 assorted missiles, the VLS would give an 'Iowa' class ship a capacity far in excess of anything else at sea, conferring the ability to launch missile salvoes and enhancing the chances of success through saturation of an enemy's defences.

Contrasting starkly with the still-conventional image of the American ships, the Soviet *Kirov* is of an entirely different breed. Although having a length of about 240 m (787 ft) and an estimated displacement of around 24,000 tonnes she is in no way a battleship in the accepted sense, the title being conferred by Western commentators in contrast to the blander Soviet categorization of 'large rocket ship'. As with most Soviet ships, the *Kirov*'s role cannot be exactly paralleled in Western practice and blanket titles are misleading.

It can be argued that the Soviet fleet has achieved 'Blue-water' status largely as a result of reacting to successive increases in range from which the West's SSBNs can strike the homeland. Larger and more flexible ships have been required which, travelling ever farther afield, have extended Soviet influence. With their enemy's SSBN threat contained as far as is practicable, a natural extension is to think more aggressively and the *Kirov* manifests this developing attitude. Thus, though well fitted for leading a surface force supporting friendly SSBNs and, through this, hunting those of the enemy, she could equally well form the nucleus of a surface action group.

In profile, *Kirov*'s deep hull betrays little of her potential, her missiles being safely below decks in the first large operational example of a VLS. Right forward is a twin-tube, reloadable launcher for the SS-N-14 which, allied to several (possibly five) organic helicopters, low-frequency hull-mounted sonar and a variable-depth sonar, give considerable stand-off ASW capacity. Second-line anti-submarine defence is the province of the usual full-calibre torpedo-tubes and multiple rocket-launchers.

Area-defence SAMs of an undetermined type are stowed beneath 12 covers of the VLS. Their number is unknown, but is probably a multiple of 12. Two of the familiar, retractable twin-arm SA-N-4 launchers flank the bridge for point defence, and no less than eight Gatling-style CIWS mountings are sited fore and aft.

Over-the-horizon (OTH) targeting is possible with the ship's own helicopters. An unknown type of SSM is housed beneath the remaining 20 covers of the VLS. No pre-Tomahawk Western warship can boast this weight of weaponry or, probably, its range.

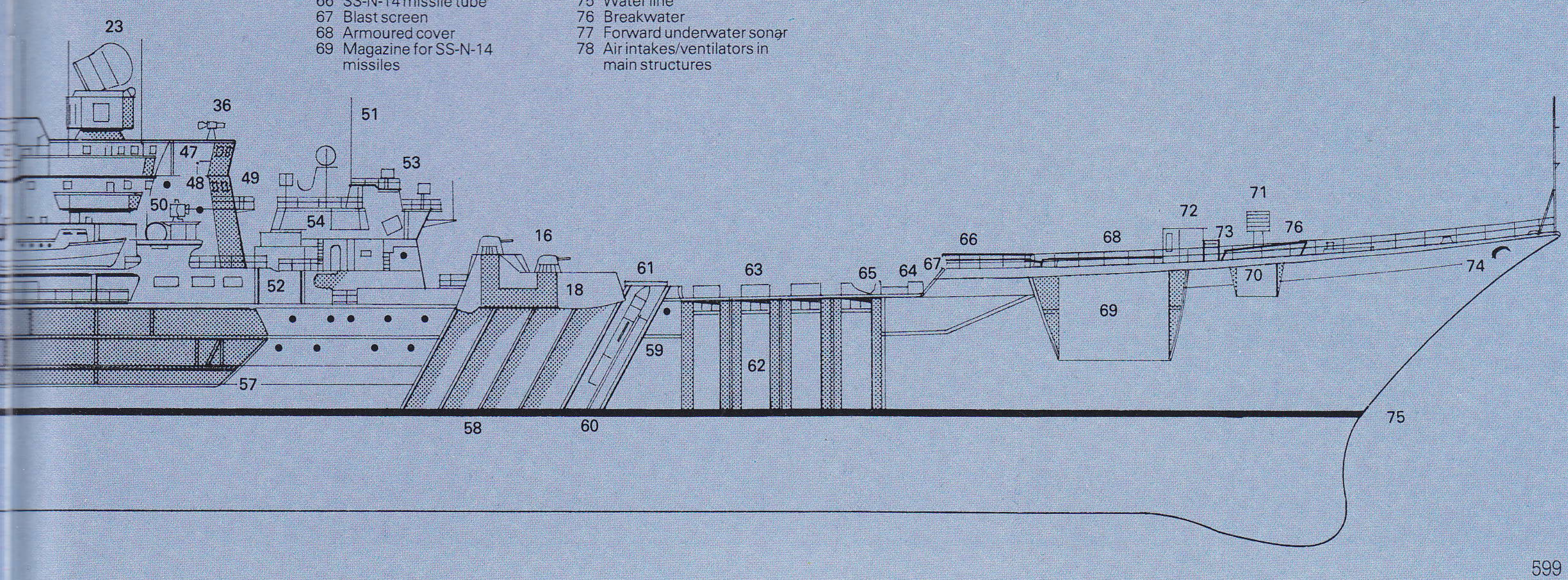
A brace of 100-mm (3.9-in) dual-purpose guns completes the all-round armament fit which, backed by an equally comprehensive electronics suite, would enable a 'Kirov' class ship to tackle any surface warship at sea today, with the exception of an 'Iowa' class ship or an attack carrier.

Great though the American battleships' operational range is, a *Kirov* is superior by virtue of her unique COmbined Steam And Nuclear (COSAN) propulsion plant, developing a possible 100,000 shp (74570 kW). It may be that power is more than usually equally divided between the two installations, with either able to be used alone for cruise purposes.

With the second 'Kirov' class ship reportedly on trials in 1983, the prospect of powerful Soviet SAGs is becoming reality. The USSR is reported also to be deploying high-energy lasers to counter SSMs and, while these will be not too effective as first-generation weapons, it would seem to place her ahead of the opposition.

In short, a 'Kirov' class ship is a battleship of today: in context, highly capable but not, on balance, quite able to defeat unaided an upgraded battleship of yesterday.

63	Hatches
64	Folding kingpost (in 'down' position)
65	Replenishment area (dry stores etc)
66	SS-N-14 missile tube
67	Blast screen
68	Armoured cover
69	Magazine for SS-N-14 missiles
70	Magazine
71	RBU 6000 rocket-launcher
72	Forward control
73	Chaff launcher
74	Hawser hole
75	Water line
76	Breakwater
77	Forward underwater sonar
78	Air intakes/ventilators in main structures



'Kirov' class (continued)

mum target engagement height is around 30000 m (98,425 ft), and with the two 'Top Dome' missile-control radars up to 12 missiles can be controlled at any one time. Close-in air defence is handled by a mix of SA-N-4 'Gecko' missiles, 30-mm CIWS mountings and 100-mm (3.9-in) DP guns.

The ASW armament is unique in being based on a reloadable twin SS-N-14 'Silex' ASW missile-launcher with associated variable-depth low-frequency sonar aft and a low-frequency bow sonar. The usual ASW rocket-launchers and 533-mm (21-in) ASW torpedoes complement the SS-N-14 system.

The *Kirov* is fitted with an extensive command, control and communications outfit, suiting the ship to act as a task group command escort to the future nuclear-powered carrier or to operate on its own. In late 1983 the second 'Kirov' class ship was completed, and it is known that this ship has an improved AA armament including, if American reports are to be believed, the first operational laser defence system. A third 'Kirov' class ship is expected in service by the late 1980s, with a fourth and final unit available by the mid-1990s.

Specification

'Kirov' class

Displacement: 22,000 tons standard and 28,000 tons full load

Dimensions: length 248.0 m (813.65 ft); beam 28.0 m (91.86 ft); draught 8.8 m (28.87 ft)

Propulsion: two pressurized-water cooled reactors with combined superheating boilers delivering 150,000 shp (111855 kW) to two shafts

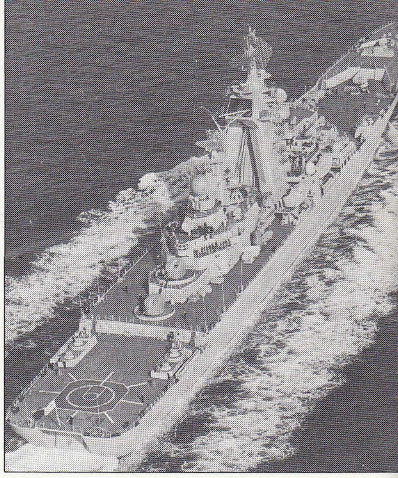
Speed: 36 kts

Complement: 800

Aircraft: five Kamov Ka-25 'Hormone' or Ka-27 'Helix' anti-submarine and missile-guidance helicopters

Armament: 20 SS-N-19 SSM launchers each with one missile, 12 SA-N-6 SAM launchers with 96 missiles, two twin SA-N-4 'Gecko' SAM launchers with 36 missiles, two 100-mm (3.9-in) DP guns, eight 30-mm ADG6-30 CIWS mountings; one twin SS-N-14 'Silex' ASW launcher with 16 missiles, one 12-barrel RBU 6000 ASW rocket-launcher, two six-barrel ASW rocket-launchers, and two quadruple 533-mm (21-in) ASW torpedo tube mountings

Electronics: one 'Top Pair' 3D radar, one 'Top Steer' 3D radar, two 'Top Dome' SA-N-6 fire-control radars, two 'Pop Group' SA-N-4 fire-control radars, three 'Palm Front' navigation radars, one 'Kite Screech' 100-mm (3.9-in) fire-control radar, two 'Eye Bowl' SS-N-14 fire-control radars, four 'Bass Tilt' CIWS fire-control radars, one 'Side Globe' ESM suite, 10 'Bell' series ECM systems, four 'Rum Tub' ECM systems, two twin chaff/flare launchers, one low-frequency bow sonar, and one low-frequency variable-depth sonar



The Kirov under way. Recent intelligence reports indicate that the second vessel of the class is undergoing final acceptance trials in the Baltic. Named* Leonid Brezhnev, *she differs in detail in the weapons and sensors from her sister ship and may carry an operational laser defence system.

USSR

'Moskva' class

Classified by the Soviets as PKRs (*Protivolodochnyy Kreyser*, or anti-submarine cruiser), the two 'Moskva' class ships are in fact hybrid helicopter carriers and missile cruisers, and were developed to counter the Western strategic missile submarines in the regional seas adjacent to the Soviet Union. However, by the time the first two vessels, the ***Moskva*** and the ***Leningrad***, had been completed at the Nikolayev South Shipyard in 1967 and 1968, it was found that they were incapable of coping with both the numbers of submarines and their capabilities, so the programme was terminated. The 'Moskva' class ships are deployed primarily to the Mediterranean as part of the Soviet 5th Eskadara. They have also on occasion appeared in the North Atlantic, North Sea, Baltic and Indian Ocean as part of deployed task forces or on transit.

In appearance the two ships are missile cruisers forward with extensive anti-air warfare and ASW systems located step-wise on the forward superstructure arrangement, which then ends abruptly in a large steam turbine exhaust stack and main radar mast assembly. A 15-m (49.2-ft) long hangar suitable for two helicopters side by side is located within this structure between the stack uptakes. The after end of the ship is taken up by an 86 m (282.2 ft) by 34 m (111.5 ft) flight deck with four mesh-covered helicopter take-off and landing spots marked out with the numbers 1 to 4. A fifth spot, marked with the letter P, is located centrally. Two 16.5 m (54.1 ft) by 4.5 m (14.8 ft) aircraft lifts serve the flight deck from the 65 m (213.25 ft) by 24 m (78.75 ft) hangar deck below. The hangar space can accommodate a maximum of 18 Kamov Ka-25 'Hormone-A' ASW helicopters, although 14 is the number usually carried. The *Leningrad* has been seen with two Mil Mi-8 'Hip-C' helicopters stowed on her flight deck for minesweeping duties when she assisted in the clearing of the southern end of the Suez Canal zone following the Yom Kippur War of 1973.

The quintuple 533-mm (21-in) ASW torpedo tubes originally carried behind the accommodation ladders in the ship's sides have been removed. The ASW armament relies on two 6000-m (6,500-yard) range 250-mm (9.84-in) calibre automatically reloaded rocket-launchers and a twin SU-W-N1 unguided ballistic missile-launcher firing the 30-km (18.6-mile) range FRAS-1 (Free Rocket Anti-Submarine) rocket fitted with a 15-kiloton nuclear depth bomb as the warhead. The target data for the FRAS-1 is generated by the low-frequency bow sonar and medium-frequency variable-depth sonar carried. The 'Hormone-A' helicopters provide the ASW screen at medium ranges (between 55 and 74 km/34 and 46 miles from the ship) using dipping sonar, sonobuoys, 450-mm (17.7-in) ASW torpedoes, and conventional and nuclear depth bombs. However, these helicopters do not have a night sonar-dipping capability such as that possessed by the later Ka-27 'Helix-A'. The 'Moskva' class ships are fitted to serve as command ships for ASW hunter-killer groups with maritime patrol ASW aircraft in support.

Specification

'Moskva' class

Displacement: 14,500 tons standard and 17,000 tons full load

Dimensions: length 189.0 m (620.1 ft); beam 26.0 m (85.3 ft); draught 7.7 m (25.25 ft)

Propulsion: geared steam turbines delivering 100,000 shp (74570 kW) to two shafts

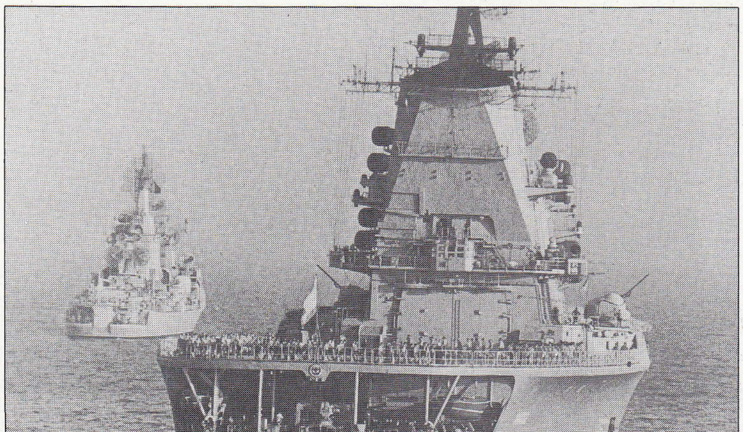
Speed: 30 kts

Complement: 850

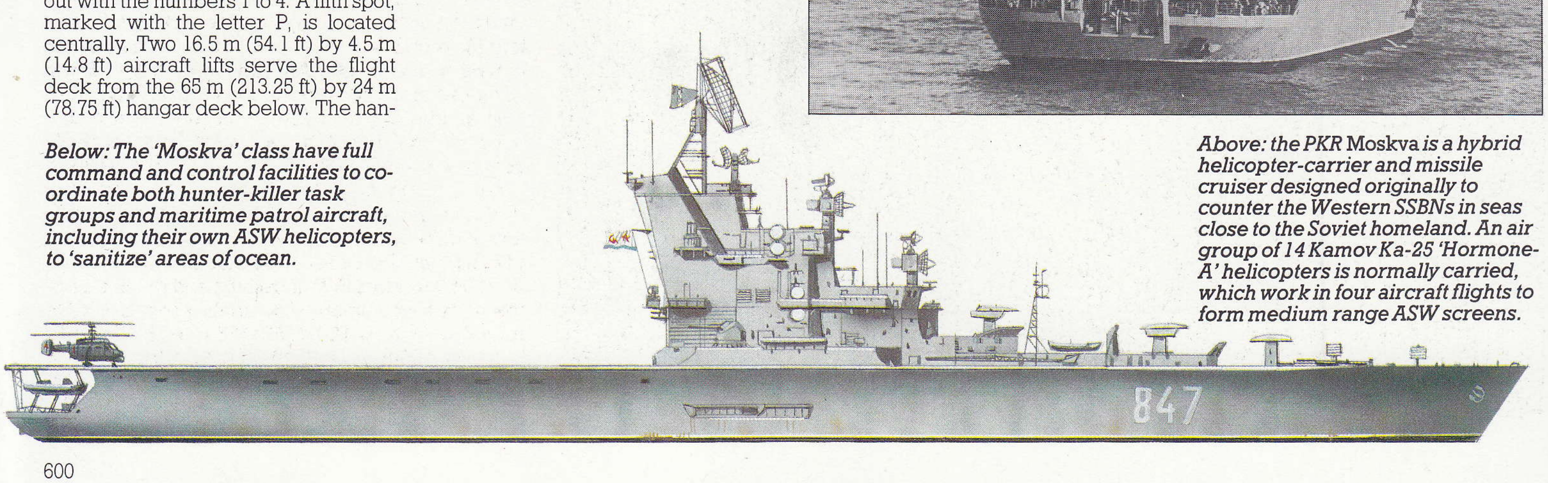
Aircraft: 18 Kamov Ka-25 'Hormone-A' anti-submarine helicopters

Armament: eight twin SA-N-3 'Goblet' SAM launchers with 48 missiles, two twin 57-mm DP guns, one twin SU-W-N1 ASW launcher with 20 FRAS-1 rockets, and two 12-barrel RBU 6000 ASW rocket-launchers

Electronics: one 'Top Sail' 3D radar, one 'Head Net-C' 3D radar, two 'Head Light' SAM fire-control radars, two 'Muff Cob' 57-mm fire-control radars, three 'Don-2' navigation radars, one 'Side Globe' ESM suite, two 'Bell Clout' ECM systems, two 'Bell Slam' ECM systems, two 'Bell Tap' ECM systems, two twin-barrel flare/chaff launchers, one low-frequency bow sonar, and one medium-frequency variable-depth sonar



Above: the PKR* Moskva *is a hybrid helicopter-carrier and missile cruiser designed originally to counter the Western SSBNs in seas close to the Soviet homeland. An air group of 14 Kamov Ka-25 'Hormone-A' helicopters is normally carried, which work in four aircraft flights to form medium range ASW screens.



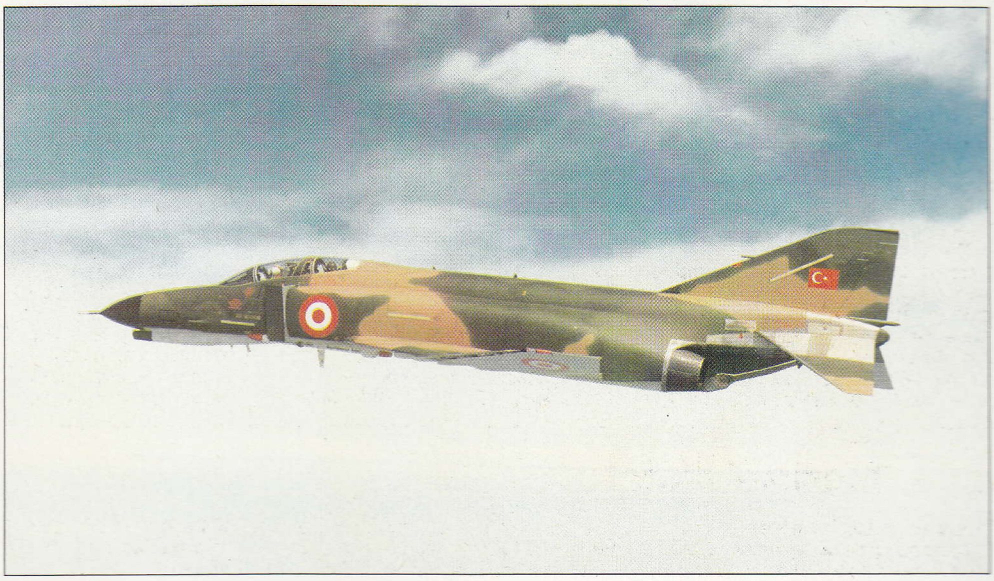
Below: The 'Moskva' class have full command and control facilities to co-ordinate both hunter-killer task groups and maritime patrol aircraft, including their own ASW helicopters, to 'sanitize' areas of ocean.

Turkey

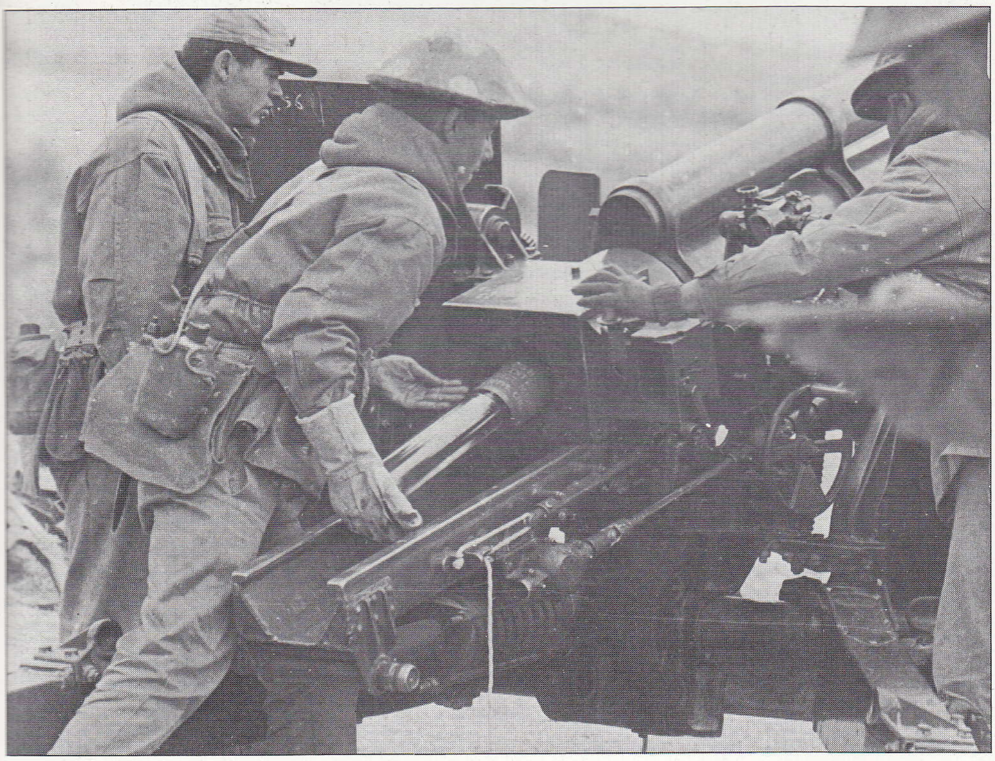
The Turkish armed forces (numbering 569,000 from a population of 47 million), and especially the army, have a special place in Turkish society, for not only was the army the founder of the modern Turksh state but it has also played the part of 'watchdog' on the Turkish constitution, in the past intervening when civilian governments have proved either inadequate or self-seeking. In name Turkey is part of NATO, but she is placed in the awkward position of having a common border with the USSR while at the same time remaining in a state of open hostility with the ancient national enemy, Greece. Thus the country's approach to NATO is ambivalent in retaining NATO ties in order to obtain financial and military assistance while at the same time offering as little offence as possible to her powerful neighbour.

The Turk is widely respected as a fierce and determined fighter, and although the nation has been involved in no large conflict since Korea the reputation is still well-earned. The members of the armed forces are mainly conscripts culled from the basically peasant stock of the nation who are hardy, capable of fierce self- and imposed discipline, and possessed of a temperament that does not admit defeat easily. While he is not brought up with a wide technical background, the average Turk learns quickly and the nation is now in the early stages of setting up its own defence-orientated industries.

The armed forces have no internal role but army officers command a force with just such a responsibility, the Gendarmerie, which is equipped as a military force. Thus it is included here although apart from an internal security role it also acts as an emergency relief force in national emergencies such as earthquakes.



The Turkish air force operates 13 fighter/ground-attack squadrons equipped with a variety of types. The most effective are probably the five squadrons of McDonnell Douglas F-4 Phantoms.



Much of the equipment fielded by the Turkish army is obsolete and requires replacement. However, while the original design of the US-supplied M101 105-mm howitzer dates back to the 1920s, it remains an effective weapon.

The Turkish Army

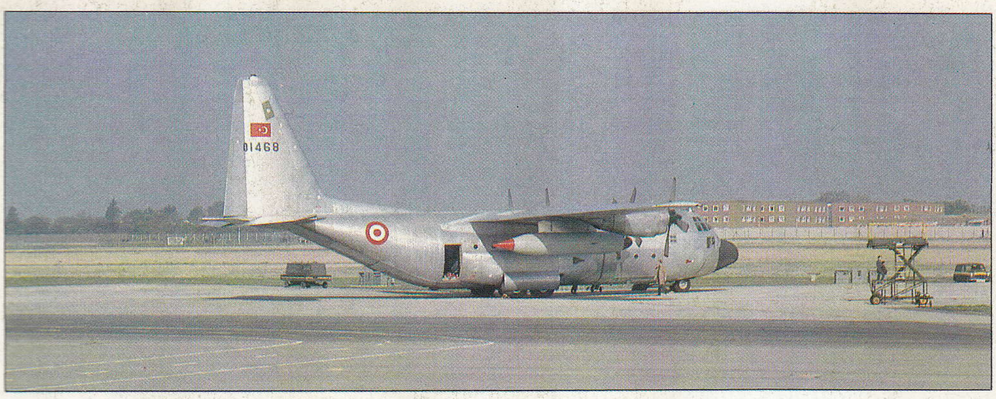
With a total strength of 470,000 (420,000 of whom are conscripts), the Turkish army is the largest in NATO outside that of the United States. All officers and NCOs are regulars who undergo their training at special academies at Ankara, very few conscripts reaching other than acting rank, although university graduates may become reserve officers. The conscript's term of service is 20 months, some of which may include basic educational training, which makes the army an even more important sector of Turkish society.

The Turkish army is large enough to be divided into three armies. The 1st Army is based at Istanbul and comprises three corps with one armoured division, five infantry divisions, one armoured brigade and one reconnaissance brigade, plus the usual army units. The 2nd Army is based at Konya and has two corps with four infantry divisions, one armoured brigade, an armoured reconnaissance regiment and other units. The 3rd Army is based at Erzincan and has three corps comprising five infantry divisions, one mountain division, an armoured brigade, a reconnaissance regiment and some other units. One further corps is maintained in Cyprus, consisting of two infantry divisions plus a sizable force of armour and artillery.

The invasion of Cyprus in 1975 was the last conflict in which Turkey was involved, although the actual fighting was slight. Cyprus is not the only item disputed with NATO neighbour Greece, for possible oil-prospecting rights in the Aegean are also in dispute. Relations between the two nations are so far from friendly that Turkey has seen fit to form a new 4th Army based at Izmir to guard the Aegean. But this formation's units are few, and are more of intent than form.

The equipment of the Turkish army is mostly obsolete, and must now be due for replacement. For example, the Turkish army is one of the last armies to retain the Honest John artillery rocket (18 units) in service, and large-calibre anti-aircraft artillery (90-mm/3.54-in M117 and M118) is still in use among a total of 900 AA guns in 40-mm, 75-mm (2.95-in) and 90-mm (3.54-in) calibres, supplementing 300 twin 20-mm cannon. The MBTs used are mainly M47s and M48s with some 77 Leopard 1s, most of them early models but available in some numbers (500 M47s and 3,000 M48s), and the infantry uses about 2,000 M113 APCs. The artillery is well equipped with ample numbers and types of equipment from the United States, whence come the 1,750 mortars in four calibres and much else of the army's equipment. The artillery arm has in its towed inventory 150 M59 155-mm (6.1-in), 140 M101A1 105-mm (4.13-in), 400 M114A1 155-mm (6.1-in) and 116 M115 203-mm (8-in) weapons, while the SP complement includes 36 M107 175-

12 PASS



Much of the Turkish air force's transport capability is provided by surviving Douglas C-47s. Heavier lift is catered for by the mixed squadrons of seven Lockheed C-130 Hercules and 20 Transall C.160s.

mm (6.89-in) guns, 400 M7/M108 105-mm (4.13-in) howitzers and 48 M110 203-mm (8-in) howitzers. Anti-tank defence is still dependent on American recoilless rifles (1,200 57-mm/2.24-in, 390 75-mm/2.95-in and 800 106-mm/4.17-in weapons), but large numbers of TOW and 2,500 MILAN missiles are now on order.

The army has a sizable air arm equipped with a large number of types, both fixed- and rotary-wing. There are 118 fixed-wing and 254 rotary-wing aircraft, with 27 more helicopters on order.

The Turkish Air Force

Like the army, the Turkish air force is equipped well enough in numbers but much of the equipment is now rather elderly. With 53,000 men, 33,000 of them conscripts, numerical strength is quite large, and the force has 340 combat aircraft. Much of the equipment is American in origin, but much of it has been obtained second-hand from other nations, like the recent purchase of 40 Lockheed F-104G Starfighters from the Netherlands. Air-defence is undertaken by two squadrons with the Aeritalia F-104S version of the Starfighter. Included in the 13 fighter/ground attack squadrons are aircraft as varied as Starfighters, North American F-100 Super Sabres, McDonnell Douglas F-4 Phantoms and Northrop F-5s. Douglas C-47 Dakotas still form an important element of the six transport squadrons, but the elderly C-47 is ideally suited to the rugged Turkish terrain. Other transport equipment includes seven Lockheed C-130E Hercules, 20 Transall C.160Ds, Vickers Viscounts and Britten-Norman Islanders. A small force of Bell UH-1D/H helicopters is also used. A VIP transport flight uses two more C-47s, and further C-47s are used by the various base flights, which also operate Lockheed T-33s and UH-1Hs. The air force is also responsible for air defence and is still equipped with 72 Nike-Hercules surface-to-air missiles, but recently a sizable order for Rapier missiles has been made.

The Turkish Navy

The Turkish navy has its main bases at Gölcuk, Istanbul, Izmir, Eregli and Iskenderun, and has a manpower strength of 46,000, of whom 36,000 are conscripts. In vessel numbers it is a sizable force, but many of the vessels are small and restricted to coastal activities. Again, much of the available equipment is no longer in the prime of life or condition, but plans are afoot for gradual modernization.

The main striking force consists of 16 submarines of which only 14 are kept in service at any one time. Ten of them are ex-American 'Guppy' class boats, five are Type 209s and one 'Tang' class boat is on loan from the USA. There are 15 ex-American destroyers and two Turkish-built frigates. Then follows a long stream of various small vessels (including 13 missile-armed craft) that vary from minesweepers to coastal patrol craft, and to back up this fleet there are no fewer than 56 auxiliary ships, including a destroyer tender. Much of this equipment is American in origin (some of it is on lease), but on order are another Type 209 submarine, four West German-designed frigates, two missile attack craft, 13 tank landing craft and a quantity of Harpoon missiles.

The navy maintains a single marine brigade: this is 5,000 strong, and has three battalions, support units and an 18-gun marine artillery battalion.

The navy also maintains an anti-submarine aircraft force made up mainly from 18 Grumman S-2E Trackers plus a number of Agusta (Bell) AB.204B and AB.212ASW helicopters. Two S-2A Trackers are held in reserve.

The Gendarmerie

According to the Turkish constitution the armed forces cannot be used for internal security purposes, so the Gendarmerie is used for the purpose. The Gendarmerie is a large force some 125,000 strong and it includes three mobile brigades armed with all the normal infantry weapons and some heavier ones such as mortars and even Commando armoured cars and APCs. There is also a maritime element to the Gendarmerie with a force of 30 fast patrol craft.

Not all the units of the Turkish armed forces have been mentioned. The army has several units that do not quite fit into any tidy structure and these include a parachute brigade, a commando brigade and several fortress defence regiments that guard the Bosporus and some other locations.

Order of Battle

Army

two mechanized infantry divisions (including tank elements)
14 infantry divisions
six armoured brigades
four mechanized brigades
11 infantry brigades
one parachute brigade
one commando brigade
eight independent armoured reconnaissance battalions
32 artillery battalions
four Honest John battalions
eight anti-aircraft artillery battalions
fortress defence regiments

Air Force

13 fighter/ground-attack squadrons (two with F-5/B, two with F-100, five with F-4E/RF-4E and three with F-104G)
two interceptor squadrons (F-104S)
one reconnaissance squadron (RF-5B)
six transport squadrons (two with C-130E and C.160, three with C-47A, and one with Islander, UH-1D/H, UH-19D and Viscount)
VIP Flight (C-47A)
nine base flights (T-33A, C-47A and UH-1H)
eight SAM squadrons (Nike-Hercules)
OCUs (F-100C/F and F/TF-104G)
three training squadrons (Beech T-34A, Cessna T-37B/C, Northrop T-38A and Cessna T-41D)

Navy

16 submarines ('Guppy', 'Tang' and 'Type 209' class)
15 destroyers ('Gearing', 'Fletcher', 'Sumner' and 'Carpenter' classes)
two frigates ('Berk' class)
13 fast attack craft (missile) of 'Lürssen FPB 57' and 'Jaguar' classes
eight fast attack craft (torpedo) of 'Girue' and 'Jaguar' classes
21 large patrol craft
four coastal patrol craft
seven minelayers
26 minesweepers
five landing ships tank (three acting as minelayers)
31 landing craft tank
36 other landing craft
56 auxiliary ships
one anti-submarine squadron (S-2E, AB.204B and AB.212ASW)
one marine brigade

Most modern of Turkey's submarine force are the West German-built Type 209 submarines, supplementing the modified World War II vintage American boats already in service. More Type 209s are on order, along with fast patrol craft for coastal defences.